H2M architects + engineers

PORT CHESTER MIDDLE SCHOOL

113 BOWMAN AVENUE

RYE BROOK, NEW YORK 10573

AUDITORIUM UPGRADES FOR PORT CHESTER MIDDLE SCHOOL

Contract G – General Construction Work
Contract M – HVAC Construction Work
Contract E – Electrical Construction Work

SED No.: 66-19-04-03-0-013-030

PROJECT MANUAL

MAY 2026

PORT CHESTER RYE UNION FREE SCHOOL DISTRICT

113 BOWMAN AVENUE

RYE BROOK, NEW YORK 10573

Port Chester Rye Union Free School District

AUDITORIUM UPGRADES FOR PORT CHESTER MIDDLE SCHOOL

Port Chester Middle School - SED Control No. 66-19-04-03-0-013-030

CONTRACT G – GENERAL CONTRUCTION WORK
CONTRACT M – HVAC CONSTRUCTION WORK
CONTRACT E – ELECTRICAL CONSTRUCTION WORK

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A) ENVIRONMENTAL SURVEY FOR PORT CHESTER MIDDLE SCHOOL
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Notice is hereby given that **SEALED BIDS** for:

Port Chester Rye Union-Free School District
AUDITORIUM UPGRADES FOR PORT CHESTER MIDDLE SCHOOL

PORT CHESTER MIDDLE SCHOOL - SED: 66-19-04-03-0-013-030

CONTRACT G - GENERAL CONSTRUCTION WORK
CONTRACT M – HVAC CONSTRUCTION WORK
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will be received until **10:00am on June 4th 2026, at the Port Chester-Rye Union Free School District main office located at 113 Bowman Avenue, Rye Brook, New York 10573.** The School District reserves the right to modify the date and/or time of the bid submission in one or more Addendum. Regardless of whether any change is made by Addendum, in the event that on the bid submission date, the Port Chester-Rye Union Free School District main office is closed or closes prior to the time for receipt of bids due to unforeseen circumstances (e.g., inclement weather, emergency conditions, etc.), bids will be due at the same time on the next day that the School District's main office is open.

Hard copies and electronic bid documents will be available beginning on **May 6th, 2026**.

Complete Digital Sets of Bidding Documents, Plans and Specifications, may be obtained online as a download at the following website: melville.h2mplanroom.com for a nonrefundable fee of **One Hundred Dollars ($100.00) for each combined set of documents. Plans and Specifications may be obtained from REVplans, 28 Church Street, Unit 7, Warwick, New York 10990, upon deposit of One Hundred Dollars ($100.00)** for each combined set of documents. Checks or money orders shall be made payable to **Port Chester-Rye Union Free School District,** checks should be sent directly to REVplans. Bidder's deposit will be refunded if the set is returned to REV in good condition within thirty (30) days following the award of the contract or the rejection of the bids covered by such plans and specifications. **Non-bidders** shall receive partial reimbursement, in an amount equal to the amount of the deposit, less the actual cost of reproduction of the documents if the set is returned in good condition within thirty (30) days following the award of the contract or the rejection of the bids covered by such plans and specifications. Any bidder requiring documents to be shipped shall make arrangements with the printer and pay for all packaging and shipping costs.

Please note REVplans melville.h2mplanroom.com is the designated location and means for distributing and obtaining all bid package information. Only those Contract Documents obtained in this manner will enable a prospective bidder to be identified as an official plan holder of record. The School District takes no responsibility for the completeness of Contract Documents obtained from other sources. Contract Documents obtained from other sources may not be accurate or may not contain addenda that may have been issued.

All bid addenda will be transmitted to registered plan holders via email and will be available at melville.h2mplanroom.com Plan holders who have paid for 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.

Bids must be made on the standard proposal form in the manner designated therein and as required by the bid instructions and specifications contained in the Project Manual; Bids must be enclosed in sealed opaque envelopes bearing the name of the job and name and address of the bidder on the outside, addressed to:

"**PURCHASING AGENT**, **Port Chester Rye Union Free School District**", clearly marked on the outside **"AUDITORIUM UPGRADES FOR PORT CHESTER MIDDLE SCHOOL – Port Chester Middle School: SED NO: 66-19-04-03-0-013-030."** The School District is not responsible for bids opened prior to the bid opening if bid number and opening date do not appear on the envelope. Bids opened prior to date and time indicated are invalid. The bidder assumes the risk of any delay in the mail, or in the handling of the mail or hand deliveries by employees of the Port Chester Rye Union Free School District as well as of improper hand delivery. The bidder is soley responsible for ensuring its bid is received at the designated location by the date and time specified in this notice or as changed in accordance with this notice.

Each proposal submitted must be accompanied by a certified check or bid bond, made payable to the "Port Chester-Rye Union Free School District", in an amount equal to five percent (5%) of the total amount of the bid, as a commitment by the bidder that, if its bid is accepted, it will enter into a contract to perform the work and will execute such further security as may be required for the faithful performance of the contract. **Certification of bonding company is required for this bid, see Instructions for Bidders.**

Each bidder shall agree to hold their bid price for forty-five (45) days after the formal bid opening.

A pre-bid meeting and walk through is scheduled for 1:00pm on Wednesday May 13th, 2026. Potential bidders are asked to meet at the main entrance to **Port Chester Middle School** where the Director of Facilities will meet with attendees and begin the walk through. Although the pre-bid meeting and walk-thru are **not** mandatory, it is highly recommended that all potential bidders make arrangements to visit the site.

Marcos Rodriguez
Director of Facilities
Port Chester Rye Union Free School District
113 Bowman Avenue
Rye Brook, New York 10573
Office: 914-934-7983

****Representatives of the bidders must be available for low bid interviews on June 8th and 9th between 12:00pm – 3:00pm.****

It is the intention of the Schools District's Board of Education to award the contract to the lowest responsive and responsible bidder, whose bid complies with the bid instructions and specifications included in the Project Manual, who has provided the required bid security. When evaluating the responsibility of a bidder the School District will consider the bidder's experience and ability to comply with the technical and financial requirements of the project. The Board of Education reserves the right to reject any or all bids, waive any informality in a bid and to accept such bid, if, in the opinion of the Board of Education, the best interests of the School District will be served.

By Order of the Board of Education
Port Chester Rye Union Free School District
113 Bowman Avenue
Rye Brook, New York 10573

BIDS FOR PROJECT

The Board of Education of the Port Chester Rye Union Free School District (hereafter called "School District" and "Owner"), will receive **SEALED PROPOSALS** for:

Port Chester Rye Union Free School District
AUDITORIUM UPGRADES FOR PORT CHESTER MIDDLE SCHOOL

PORT CHESTER MIDDLE SCHOOL - SED: 66-19-04-03-0-013-030

CONTRACT G - GENERAL CONSTRUCTION WORK
CONTRACT M – HVAC CONSTRUCTION WORK
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TIME AND PLACE

The sealed proposals are to be submitted at the:

Port Chester Rye Union Free School District
ADMINISTRATION OFFICE
113 Bowman Avenue
Rye Brook, New York 10573

The date and time of the bid opening is stated in the Notice to Bidders and is subject to modification by Addenda issued prior to the opening of bids.

REQUIRED BID SUBMISSIONS

Each bid submission shall consist of two (2) sealed envelopes containing the following items. The bidder shall carefully remove all forms from the Project Manual. The Project Manual itself should not be submitted or included in the bid package.

Envelope No. 1 - BID PROPOSAL:

This envelope shall be clearly marked with the name of the project, bidder's name, and marked "**BID PROPOSAL**" in large lettering on the envelope and shall contain the following items:

1. Certified check or Bid Bond in the amount totaling 5% of the base bid.

2. Certified letter from bidder's Bonding Company, indicating that they will issue the bidder (if awarded a contract) bonds that meet the criteria set forth in Article 11 of the General Conditions.

3. Certified letter that the company bidding this project has been in business under the same name for a period of five years or longer and is not currently disbarred from bidding or working on public works projects by the New York State Department of Labor.

4. One (1) fully executed original and one (1) copy (marked “copy”) of the following:

   a. Bidder’s Declaration (Section 004105).

   b. Proposal forms (Section 004116).

   c. Insurance Certification (Section 004357).

   d. Non-collusive form (Section 004519).

   e. Hold Harmless Agreement (Section 004521).

   f. Certification of Compliance with the Iran Divestment Act or Declaration of Bidder’s Inability to provide Certification of Compliance with the Iran Divestment Act (Section 004547).

   g. Sexual Harassment Certification (Section 004548).

   h. Labor Law Section 220-i Certification Form (Section 004549) together with a copy of the Certificate(s) of Registration issued by the Commissioner of the Department of Labor for the Bidder and each of its subcontractor(s).

   i. If the bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof. Each bid must be accompanied by all required forms located in the specifications (including but not limited to Bidder’s Declaration, Proposal forms, Insurance Certification form, Non-Collusive form, Hold Harmless Agreement, Iran Divestment Act form, Sexual Harassment Certification Form, Labor Law Section 220-i Certification Form, etc.). Failure to provide any form may result in the School District finding the bidder "non-responsive" to the bid requirements, unless such failure is deemed an informality by the School District.

Envelope No. 2 - BID QUALIFICATIONS:

This envelope shall be clearly marked with the name of the project, bidders name, and marked “**BID QUALIFICATIONS**” in large lettering on the envelope and shall contain the following items:

1. A description of its experience with projects of comparative size, complexity and cost together with documentary evidence showing that said projects were completed to the Owner’s satisfaction and were completed in a timely fashion.

2. Documentation from five projects completed within the past five years:

   a. timeliness of performance of the work of the project.

   b. evidence that the project was completed to the Owner’s satisfaction.

   c. whether any extensions of time were requested and if such requests were granted.

   d. whether litigation and/or arbitration was commenced by either the Owner or the bidder as a result of the work of the project completed by the bidder.

   e. whether any liens were filed on the project by subcontractors or material suppliers of

the bidder.

f. whether the bidder was defaulted on the project by the owner.

g. whether the bidder made any claims for extra work on the project, including whether said claim resulted in a change order.

3. Documentation evidencing the bidder's financial responsibility, including the bidder's most recent certified financial statement prepared by a certified public accountant.

4. Fully completed Statement of Bidder's Qualification (Section 002515).

5. Fully completed list of subcontractors.

6. References and Experience:

a. List of all past contracts with K-12 Public School Districts

b. Provide three (3) references (name, title, phone number, email) of persons 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.

DETERMINATION OF BIDDERS

In the consideration and acceptance of any proposal, the School District shall be entitled to exercise every measure of lawful discretion in evaluating the financial history and ability of the Bidder and its past performance in ventures of this or similar nature. Such data will be considered either as a material or controlling factor in the acceptance of any bid submitted.

1. Bidders must prove to the satisfaction of the School District that they are reputable, reliable and responsible.

2. Bidders must complete Labor Law Section 220-i Certification Form (Section 004549) and provide a copy of the Certificate(s) of Registration issued by the Commissioner of the Department of Labor for the Bidder and for each of its subcontractor(s). Failure to provide this Form and the Certificate(s) of Registration in their bid may result in rejection of their bid as nonresponsive.

3. If awarded a contract as a result of this bid, the Bidder must ensure that each and every subcontractor engaged to perform work pursuant to the awarded contract is registered in accordance with Section 220-i of the New York Labor Law before commencing any work and must provide copies of each subcontractor's certificate of registration to the School District before the subcontractor commences any work pursuant to the awarded contract.

4. The School District may make any investigation it deems necessary to assure itself of the ability of the Bidder to perform the work.

5. The School District reserves the right to reject any or all proposals and to accept the bid proposal of the lowest responsive and responsible bidder.

6. A tie-bid is defined as an instance where bids are received from two or more Bidders who are the lowest responsive and responsible Bidders, and their bids are identical. If two or more bids are tied, the School District's Board of Education has the discretion to select one of the tied bids for a contract award

and the determination of the Board to award a contract(s) to one of the tied Bidders shall be final and binding on all tied bids.

DEPOSITS

Bidders deposit for the Bid Documents will be refunded if the set is returned in good condition within thirty (30) days following the award of the contract or the rejection of the bids covered by such plans and specifications. Non-bidders shall receive partial reimbursement, in an amount equal to the amount of the deposit, less the actual cost of reproduction of the documents if the set is returned in good condition within thirty (30) days following the award of the contract or the rejection of the bids covered by such plans and specifications.

VERBAL ANSWERS

The School District, its agents, servants, employees and the Architect/Engineer shall not be responsible in any manner for verbal answers to inquiries made regarding the meaning of the Contract Documents (which include but are not limited to the Project Drawings and the Specifications) prior to the awarding of a contract.

For information with reference to the work and its location during bid phase by prospective bidders, questions shall be submitted in writing to:

Brian Paddack
Senior Architect
H2M architects + engineers
1133 Westchester Avenue, Suite N-210
White Plains, New York 10605
Phone: 914-358-5623 x 2064
E-mail: bpaddack@h2m.com

Luke Samuels
Staff Designer
H2M architects + engineers
1133 Westchester Avenue, Suite N-210
White Plains, New York 10605
Phone: 914-231-8265
E-mail: lsamuels@h2m.com

To be given consideration, questions must be received in writing at least ten (10) calendar days prior to the date fixed for the opening of bids. Any and all responses to questions received will be provided in the form of written addenda and will be transmitted to registered plan holders via email and will be available at www.revplans.com.

ADDENDA AND INTERPRETATIONS

No interpretations of the meaning of the plans, specifications or other Contract Documents will be made to any bidder orally. Every request for such interpretation shall be made in writing, addressed to:

Brian Paddack
Senior Architect
H2M architects + engineers
1133 Westchester Avenue, Suite N-210
White Plains, New York 10605
Phone: 914-358-5623 x 2064
E-mail: bpaddack@h2m.com

Luke Samuels
Staff Designer
H2M architects + engineers
1133 Westchester Avenue, Suite N-210
White Plains, New York 10605
Phone: 914-231-8265
E-mail: lsamuels@h2m.com

To be given consideration, requests for interpretation must be received in writing at least ten (10) calendar days prior to the date fixed for the opening of bids. Any and all interpretations and any supplemental instructions will be provided in the form of written addenda, and will be transmitted to registered plan holders via email and will be available at www.revplans.com.

All addenda so issued shall become part of the Contract Documents. If any addenda may materially affect the bid, as solely determined by the District, the District may extend the bid date.

PRE-BID INSPECTION OF SITE

Each bidder shall conduct on-site inspections of the referenced project site during the pre-bid walkthrough prior to submission of a bid proposal. Pre-bid walkthroughs will be available as stated in the Notice to Bidders, subject to modification by Addenda issued prior to the opening of bids.

Each bidder shall acquaint themselves with all apparent conditions and characteristics of the facility regarding assessment of required materials quantities, evaluation of quality of existing materials, access to the site and equipment, location of underground utilities, clearances and all related information necessary to develop an understanding of the required scope of the work and all field conditions. Bidders must satisfy themselves by personal examination of the location of the proposed work and of the actual conditions and requirements of the work and shall not, at any time after the submission of their bids, dispute or complain of such estimate or assert there was any misunderstanding in regard to the depth or character or the nature of the work to be done. No consideration will be given for subsequent additional claims by the contractor of award after bidding with regard to apparent field conditions.

PRE-BID MEETING AND INSPECTION OF SITE

See Section “Notice to Bidders,” , subject to modification by Addenda issued prior to the opening of bids.

BIDDER TO BE FAMILIAR WITH PLANS AND REQUIREMENTS

It is the bidder's responsibility to examine carefully the Project Plans and Specifications, other Contract Documents, its bid proposal and the site upon which the Work is to be performed. Submission of a bid proposal shall be prima facie evidence that the bidder has made such examination and that the bidder is familiar with all the conditions and requirements.

PREPARATION OF BID PROPOSAL

The Bid Proposal forms for the project contained herein must be used in preparing bids. Failure to use said Proposal forms or the inclusion of bids not requested shall result in rejection of the bid as nonresponsive.

No proposal shall be received by the School District unless the bidder tendering same is known to be skilled in work of a similar nature to that envisaged in the Proposal.

Each bidder shall fill out in ink (in both words and figures) and signed by an officer of the corporation in the spaces provided, its unit or lump sum bid, as the case may be, for each item in the Proposal. If there is a discrepancy between the prices in words and figures, the prices in words shall govern as unit and lump sum prices.

No bid will be considered which does not include bids for all items listed in the proposal sheets.

NAME OF BIDDER

Each bidder must state in the Proposal its full name and business address, and the full name of every person, firm or corporation interested therein and the address of every person or firm, or president and secretary of every corporation interested with it; if no other person, firm or corporation be so interested, it must affirmatively state such fact. The Bidder must also state that the Proposal is made without any connection (directly or indirectly) with any other bidder for the work mentioned in its proposal and is (in all respects) without fraud or collusion; it has inspected the site of the work, has examined the Contract, General Conditions, Specifications, Plans, all addenda, and Information for Bidders; no person acting for or employed by the School District is directly or indirectly interested in the bid or Bidder, or in the supplies or work to which it relates or in any portion of the prospective profits thereof; it proposes and agrees if its proposal or bid is accepted, to execute a contract with the School District to perform the work mentioned in the contract, plans and specifications attached; and the amount it will accept in full payment.

CERTIFIED CHECK OR BID BOND/BONDING CERTIFICATION

Each bid must be accompanied by either a certified check drawn on a solvent bank with an office in the State of New York, or a bid bond equal to five percent (5%) of the total amount of the project bid, and payable to the "Port Chester Rye Union Free School District**"**. This amount shall be the measure of liquidated damages sustained by the School District as a result of the failure, negligence or refusal of the Bidder to whom the contract is awarded to execute and deliver the Agreement and satisfactory payment and performance bonds. Provide a certified statement that a bonding company will issue bonds that meet or exceed the requirements set forth in Article 11 of the General Condition if the bidder is awarded the contract.

A Performance and Payment bond will be required for the work. Each shall be in the amount of 100% of the contract sum. Refer to Article 11 of the General Conditions for requirements associated with such bonds.

PERMITS AND REGULATIONS

Each Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. Each Contractor is required to observe all laws and ordinances including, but not limited to, relating to the obstructing of streets, maintaining signals, keeping open passageways and protecting them where exposed to danger, and all general ordinances affecting the Contractor, the Contractor's employees, or the Contractor's work hereunder in the Contractor's relations to the Owner or any person. Each Contractor shall also obey all laws and ordinances controlling or limiting the Contractor while engaged in the prosecution of the work under this Contract.

If the Contractor observes that the drawings and specifications are at variance with laws and regulations, the Contractor shall promptly notify the Architect in writing and any necessary changes will be provided in an Addendum or other modification of the Contract Documents. If the Contractor performs any work knowing it be contrary to such laws, ordinances, rules, regulations, or specifications, or local, state or federal authorities without such notice to the Architect, the Contractor will bear all costs arising therefrom.

BIDDER'S UNDERSTANDING

It is understood and agreed that the Contractor has, by careful examination, satisfied themselves as to the nature and location of the Work, and confirmation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions, and all other matters which can in any way affect the work under the contract that the Owner intends to award.

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

It is understood and agreed that the Contractor has informed himself fully as to the conditions relating to construction and labor under which the work will be performed and agrees as far as possible to employ such methods and means in the performance of the Contractor's work so as not to cause interruption or interference with any other Contractor.

EQUIVALENTS

A. In the Specifications, one or more kinds, types, brands, or manufacturers of materials are regarded as the required standard of quality and are presumed to be equal. The contractor may select one of these items or, if the contractor desires to use any kind type, brand, or manufacturer or material other than those named in the specifications, they shall indicate in writing when requested, and prior to award of contract, what kind, type, brand or manufacturer is included in the base bid for the specified item.

B. Submission for equivalents shall be submitted to the Architect prior to the award of the contract.

C. Refer to Article 6(V) of the General Conditions for submission requirements. Contractor shall provide the Architect with the same documentation as required for substituted materials as set forth in Article 6(W) of the General Conditions.

BID EVALUATION

The Owner and Architect may make such investigation as they deem necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish the Owner with all such additional information and data for this purpose as may be requested. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein.

BID WITHDRAWAL

No bids may be withdrawn for a period of 45 days after opening of bids. After 45 days, unless a Bidder had notified the Owner of the withdrawal of its bid, the bid shall remain firm and unchanged.

CONTRACTOR'S QUALIFICATION STATEMENT (POST BID)

The apparent low bidder must submit the required pre-award submittal package described below to the Owner's Construction Representative within 48 hours after the bids are opened.

Submissions must be emailed and must include the Project Name of this contract in the Subject Line of the Pre-Award submission email.

1. Pre-Award Submittal Package
    a. References and experience:
        (1) List of all past contracts with K-12 Public School Districts.
        (2) Provide three (3) references (Name, Title, Phone Number and email) of persons associated with three (3) different Projects (public or private sector) of similar scope and size to the one being bid right now. Additionally, include the names of two (2) major suppliers used for each of these three (3) projects.

2. Workforce and Work Plan - Provide a detailed written Work Plan which shall demonstrate the contractor's understanding of overall project scope and shall include, but not be limited, to the following:
    a. Sequential listing of specific project activities required to successfully complete the Work of the Contract.
        (1) Include Schedule and list Critical Milestones.
        (2) Include Phasing of the work, if required.
        (3) Include listing of long lead-time items.
        (4) Impact of weather and restricted work periods.
        (5) Signed statement from a company officer that the Project can be completed in the established construction duration listed in the Contract Documents.
    b. Resumes for the contractor's proposed project site supervisor and staff including qualifications for specialized expertise or any certifications required to perform the Work.
    c. Names of proposed major sub-contractors (more than 15% of the bid amount) and a listing of the related trade work and value.
    d. Any special coordination requirements with other trades or ongoing contracts under separate contract(s).
    e. Any special storage and/ or staging requirements for construction materials required for the work.
    f. Any other special requirements including those noted in the Contract Documents or known to the contractor / subcontractor(s).

3. Detailed Cost Estimate:
    a. A copy of Detailed Cost Estimate outlined in CSI format for the contract work.

NOTICE OF ACCEPTANCE

The School District shall give notice of acceptance of a bid by either registered or certified mail.

SIGNING OF CONTRACT

Each Bidder to whom a contract is awarded, shall, at the office of the School District within ten (10) business days after the date of notification by either registered or certified mail of acceptance of its proposal furnish the required payment and performance bonds in an amount of 100% of the contract, and the required insurance as set forth in Article 10 of the General Conditions, and sign the contract for the work for its performance and maintenance.

INSURANCE

The amounts, types and clauses to be included in the insurance that is required to be carried by the successful bidder and its subcontractors, are set forth in Article 10 of the General Conditions.

WAIVER OF IMMUNITY

Attention is directed to the statement of non-collusion required by Article 5A of the "General Municipal Law of the State of New York" concerning Waiver of Immunity and included in the attached Agreement.

RESPONSIBILITY OF BIDDER

The attention of Bidders is directed particularly to the contract provisions whereby the Contractor will be responsible for any loss or damage that may occur to the work or any part thereof during its progress and whereby the Contractor must make good any defects or faults in the work that may occur during the progress or within one (1) year after its acceptance.

Each Contractor shall provide for the continuation of the Performance Bond as a Maintenance Bond for one (1) full year after date of final payment request at the full contract price.

The work is to be performed and completed to the satisfaction of the Owner & Architect/Engineer and in accordance with the specifications annexed hereto and the plans referred to therein.

LABOR RATES

Each Contractor shall pay not less than the minimum hourly wage rates on those contracts as established in accordance with Section 220 of the Labor Law as shown in the schedule.

Article 8, Section 220 of the Labor Law, provides (among other things) that it shall be the duty of the fiscal officer to make a determination of the schedule of wages to be paid to all laborers, workers and

mechanics employed on public work projects, including supplements for welfare, pension, vacation and other benefits. These supplements include hospital, surgical or medical insurance, or benefits; life insurance or death benefits; accidental death or dismemberment insurance; and pension or retirement benefits. If the amount of supplements provided by the employer is less than the total supplements shown on the wage schedule, the difference shall be paid in cash to the employee.

Article 8, Section 220 of the Labor Law, also provides that the supplements to be provided to laborers, workers and mechanics upon public work, "...shall be in accordance with the prevailing practices in the locality..." The amount for supplements listed on the enclosed schedule does not necessarily include all types of prevailing supplements in the locality, and a future determination of the Industrial Commissioner may require the Contractor to provide additional supplements.

The original payrolls or transcripts must be preserved for at least six (6) years from the completion of the work on the awarded project by the Contracts. Each payment application made by the Contractor pursuant to the Contract Documents must be accompanied by certified payrolls for any labor for which payment is sought.

Port Chester Rye Union Free School District

Board of Education

113 Bowman Avenue

Rye Brook, New York 1057

RFI FORM

CONTRACTOR'S REQUEST FOR INTERPRETATION NO. ___ H2M RFI NO:_____

NAME OF PROJECT: Auditorium Upgrades for Port Chester Middle School

NAME OF OWNER: **Port Chester Rye Union Free School District**
FACILITY: **Port Chester Middle School**
DATE: _____
A/E PROJECT NO: **PRSD 2414**
ARCHITECT: **H2M architects + engineers**

1133 Westchester Avenue, Suite N-210
White Plains, NY 10605
Brian Paddack: (914) 358-5623 x 2064 // bpaddack@h2m.com
Luke Samuels: (914) 231-8265 // lsamuels@h2m.com

FROM (CO. NAME):_____
CONTACT NAME: _____
Tel: _____**E-mail:** _____
SUBJECT: _____
DISCIPLINE/TRADE: _____
DWG./SPEC. REFERENCE: _____
QUESTION: _____
_____
_____
_____

___**FIELD CONDITION**_____
___**DRAWING/SPEC** _____
___**DISCREPANCY**_____
___**OWNER CHANGE**_____
___**CLARIFICATION** _____
___**CONTRACTOR'S SUGGESTION (IF APPLICABLE):** _____

ANSWER

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.

QUALIFICATIONS OF BIDDERS

Experience and Qualifications of the Bidder: As part of its bid (in Envelope No. 2), each bidder is required to submit the following documentation to demonstrate its experience and qualifications for the work of the Project for which a bid is submitted as well as the following Statement of Bidder's Qualifications.

a. A description of its experience with projects of comparative size, complexity, and cost, together with documentary evidence showing that said projects were completed to the Owner's satisfaction and were completed in a timely fashion;

b. Documentation for five (5) Projects it has performed capital Work in the last five (5) years concerning the bidder's:

(i) timeliness of performance of the work of the project

(ii) evidence that the project was completed to the Owner's satisfaction;

(ii) whether or not any extensions of time were requested by the contractor and whether or not such requests were granted;

(iv) whether litigation and/or arbitration was commenced by either the Owner or the bidder as a result of the work of the project performed by the bidder;

(v) whether any liens were filed on the project by subcontractors or material suppliers of the bidder;

(vi) whether the bidder was defaulted on the project by the owner;

(vii) whether the bidder made any claims for extra work on the project, including whether said claim resulted in a change order;

c. Documentation evidencing the bidder's financial responsibility, including the bidder's most recent certified financial statement prepared by a certified public accountant.

d. Documentation evidencing the bidder's existence under the same name for the last five (5) years.

e. Documentation evidencing the bidder's Worker's Compensation Experience Modification.

f. Documentation evidencing the bidder and the bidder's subcontractors are registered with the New York Department of Labor in accordance with New York Labor Law Section 220-i, which documentation must include a completed Labor Law Section 220-i Certification Form (Section 004549) and a copy of the Certificate(s) of Registration issued by the Commissioner of the Department of Labor for the bidder and for each of the bidder's subcontractor(s). Failure to provide this Form and the Certificate(s) of Registration may result in rejection of the bidder's bid as nonresponsive. If awarded a contract as a result of this bid, the bidder must ensure that each and every subcontractor engaged to perform work pursuant to the awarded contract is registered in accordance with Section 220-i of the New York Labor Law before commencing any work.

STATEMENT OF BIDDER'S QUALIFICATIONS

IMPORTANT: BIDDERS ARE REQUIRED TO FURNISH COMPLETE ANSWERS TO ALL OF THE QUESTIONS IN THIS STATEMENT. IF ADDITIONAL SPACE IS REQUIRED TO FURNISH A COMPLETE ANSWER, BIDDER MAY ATTACH ADDITIONAL PAGES AS NECESSARY. IN THE EVENT THAT COMPLETE ANSWERS ARE NOT PROVIDED TO EVERY QUESTION, THE BID MAY BE REJECTED AS NON-RESPONSIVE.

1. Name of bidder

_____

2. Type of Business Entity (e.g., sole proprietor, partnership, corporation, LLC, etc.)

_____

3. If the bidder is a corporation, state the date and place of incorporation of the corporation.

_____

4. For how many years has the bidder done business under its present name?

_____

5. List the persons who are directors, officers, owners, managerial employees or partners in the bidder's business, (use additional sheets, if needed).

_____

_____

_____

_____

6. Have any of the persons listed in Number 5 owned/operated/been shareholders in any other companies? Check one: _____ YES _____ NO. If YES is checked, list said persons and the name of each of their other companies:

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

8. During the three (3) year period preceding the submission of this bid, has the bidder been found guilty of any OSHA Violations? If the answer to this question is yes, describe the nature of each OSHA violation and provide an explanation of the remedial or other steps taken to address each such violation.

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

_____

_____

_____

_____

_____

10. During the ten (10) year period preceding the submission of this bid, has the bidder been named as a party in any lawsuit 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.

_____

_____

_____

_____

_____

11. During the ten (10) year period preceding the submission of this bid, has the bidder been the subject of an investigation and/or proceedings before the Department of Labor for alleged violations of the Labor Law as it relates to the payment of prevailing wages and/or supplemental payment requirements? If the answer to this question is yes, please list each such instance of the commencement of a Department of Labor proceeding, for which project such proceeding was commenced, and the status of the proceeding at the time of the submission of this bid.

_____

_____

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

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

14. Has the bidder, its officers, directors, owner and/or managerial employees been convicted of a crime or been the subject of a criminal indictment? 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 disposition of the charge.

15. 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.

16. Has the bidder bid on any projects for the period September 1, 2019 to the present?. If the answer is yes, list the date awarded to the bidder and the expected date of commencement of the work for said project and the status of the work for said project. For those projects listed, if the bidder was not awarded the contract, state whether the bidder was the lowest monetary bidder.

IMPORTANT: BIDDERS ARE REQUIRED TO FURNISH A COMPLETE LIST OF PROJECTS AS REQUIRED BY THIS QUESTION #16 WITH ITS BID. IN THE EVENT THE LIST REQUESTED IS NOT SUBMITTED WITH THE BIDDER'S BID OR AN INCOMPLETE LIST IS SUBMITTED, THE BID MAY BE REJECTED AS NONRESPONSIVE.

17. Does the bidder have any projects ongoing at the time of the submission of this bid? If the answer to this question is yes, list the projects on which the bidder is currently working, the percentage complete, and the expected date of completion of said project.

IMPORTANT: BIDDERS ARE REQUIRED TO FURNISH A COMPLETE LIST OF PROJECTS AS REQUIRED BY THIS QUESTION #17 WITH ITS BID. IN THE EVENT THE LIST REQUESTED IS NOT SUBMITTED WITH THE BIDDER'S BID OR AN INCOMPLETE LIST IS SUBMITTED, THE BID MAY BE REJECTED AS NONRESPONSIVE.

18. Have the bidder and its bond surety ever been notified by a project owner that the owner is contemplating declaring a default and requested a conference to discuss the performance of the contract? If the answer to this question is yes, list the projects on which such a conference was held, and the result of the conference, and the status of the project in question.

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

IMPORTANT: BIDDERS ARE REQUIRED TO FURNISH A COMPLETE LIST OF PROJECTS AS REQUIRED BY THIS QUESTION #19 WITH ITS BID. IN THE EVENT THE LIST REQUESTED IS NOT SUBMITTED WITH THE BIDDER'S BID OR AN INCOMPLETE LIST IS SUBMITTED, THE BID MAY BE REJECTED AS NONRESPONSIVE.

20. Has the bidder's surety ever been contacted to provide supervisory services in connection with an on-going project? If the answer to this question is yes, list the project(s) for which the surety provided supervisory services.

IMPORTANT: BIDDERS ARE REQUIRED TO FURNISH A COMPLETE LIST OF PROJECTS AS REQUIRED BY THIS QUESTION #20 WITH ITS BID. IN THE EVENT THE LIST REQUESTED IS NOT SUBMITTED WITH THE BIDDER'S BID OR THE LIST SUBMITTED IS INCOMPLETE, THE BID MAY BE REJECTED AS NONRESPONSIVE.

21. Did the Bidder ever fail to complete any work awarded to it by a municipality or school district? If the answer to this question is yes, please describe for whom the Bidder failed to complete any work and the reasons for the failure to complete the work.

IMPORTANT: BIDDERS ARE REQUIRED TO FURNISH A COMPLETE LIST AS REQUIRED BY THIS QUESTION #21 WITH ITS BID. IN THE EVENT THE LIST REQUESTED IS NOT SUBMITTED WITH THE BIDDER'S BID OR THE LIST SUBMITTED IS INCOMPLETE, THE BID MAY BE REJECTED AS NONRESPONSIVE.

22. Bidder's Worker's Compensation Experience Modifier: _____

Dated: By: _____
(Signature)

_____
(Print Name and Title)

Sworn to before me this

_____day of_____, 20____

_____
Notary Public

Notary Public

BIDDER'S DECLARATION:

The undersigned, as Bidder, declares that the only person or persons interested in this bid or proposal as a principal(s) is/are named herein; and that no other person than herein named has any interest in this proposal or in the contract proposed to be taken; that this bid or proposal is made without any connections with any other person or persons making a bid or proposal for the same purpose; that the bid or proposal is in all respects fair and without collusion or fraud; that the bidder has examined the site of the work and the Contract Documents and fully understands all the same; and bidder proposes and agrees, if this bid proposal is accepted, the bidder will contract with the Port Chester Rye Union Free School District in the Contract accompanying this bid to furnish all the material, implements, etc., and perform all the work required in accordance with the Contract Documents; and the bidder will accept in full payment therefore the sum(s) stated in the bidder's bid.

Acknowledgement that the foregoing Bidder's Declaration is true and factual.

SIGNATURE	PRINT NAME	TITLE	DATE

END OF SECTION

CONTRACT G - GENERAL CONSTRUCTION

Note: The bidder is asked to use either black ink or typewriter (black ribbon) in completing this proposal form. Each line-item amount must be completed. Failure to do so will be grounds for disqualification of the bidder.

ITEM 1 - BONDS and INSURANCES

(written in words) _____($)

ITEM 2 – DIVISION 1 – GENERAL REQUIREMENTS

(written in words)_____($)

ITEM 3 – DIVISION 1 – PROJECT SUPERVISION

(written in words) _____($)

ITEM 4 - DIVISION 2 - DEMOLITION WORK

(written in words) _____($)

ITEM 5 - DIVISION 2 – ABATEMENT

(written in words) _____($)

ITEM 6 – DIVISION 3 – CONCRETE

(written in words)_____($)

ITEM 7 – DIVISION 4 – MASONRY

(written in words)_____($)

ITEM 8 – DIVISION 5 – METALS

(written in words) _____($)

ITEM 9 – DIVISION 6 – WOOD, PLASTICS AND COMPOSITES

(written in words) _____($)

ITEM 10 – DIVISION 7 – THERMAL AND MOISTURE PROTECTION

(written in words) _____($)

ITEM 11 – DIVISION 8 – OPENINGS

(written in words) _____($)

ITEM 12 – DIVISION 9 - FINISHES

(written in words) _____($)

ITEM 13 – DIVISION 10 – SPECIALTIES

(written in words) _____($)

ITEM 14 – DIVISION 12 – FURNISHINGS

(written in words)_____($)

ITEM 15 - PROJECT CLOSEOUT

(written in words) _____($)

ITEM 16 - ALLOWANCE G1 – CASH ALLOWANCE FOR CONTINGENCY

For use according to owner's instructions, see section 012100.

(written in words) **ONE HUNDRED FIFTY THOUSAND DOLLARS AND ZERO CENTS ($ 150,000.00)**

CONTRACT G – TOTAL GENERAL CONSTRUCTION BASE BID INCLUDING ALLOWANCE (ITEMS 1-16)

(written in words) _____($)

Note: The Port Chester Rye Union Free School District is exempt from Federal, New York State and local taxes. TOTAL AMOUNT BID shall be exclusive of all taxes.

LEGITIMATE CONSTRUCTION NEED SHALL INCLUDE, BUT NOT BE LIMITED TO:

A CHANGE IN PROJECT SPECIFICATIONS,

A CHANGE IN CONSTRUCTION MATERIAL COSTS,

A CHANGE IN SUBCONTRACTOR STATUS, OR

THE SUBCONTRACTOR HAS BECOME UNWILLING, UNABLE OR UNAVAILABLE TO PERFORM THE SUBCONTRACT.

PAYMENTS TO SUBCONTRACTORS AND MATERIAL MEN MUST BE MADE WITHIN 7 CALENDAR DAYS OF THE RECEIPT OF PAYMENT FROM THE PUBLIC OWNER. FAILURE TO PAY SUBCONTRACTORS ON TIME MAY RESULT IN THE SUBCONTRACTORS BEING ENTITLED TO INTEREST FROM THE CONTRACTOR ON THE SUM DUE FOR ALL CALENDAR DAYS SUBSEQUENT TO THE SEVENTH DAY THROUGH THE DATE THAT PAYMENT IS MADE.

THE BIDDER UNDERSTANDS THAT THE OWNER RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS AND TO WAIVE ANY INFORMALITIES IN THE BIDDING.

THE BIDDER AGREES THAT THE BID SHALL BE GOOD AND MAY NOT BE WITHDRAWN FOR A PERIOD OF FORTY-FIVE (45) CALENDAR DAYS AFTER THE OPENING OF BIDS.

THE BIDDER IS REQUIRED TO VISIT THE SITE FOR A FIELD SURVEY TO VERIFY THE SCOPE OF WORK PRIOR TO BID SUBMISSION.

THE BIDDER HAS SUBMITTED ALL REQUESTS FOR OTHER BRAND NAMES OR PRODUCTS NOT LISTED IN THE SPECIFICATIONS IN ACCORDANCE WITH ARTICLES 6(V) AND 6(W) OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION.

ALTERNATES

THE CONTRACTOR SHALL CLEARLY STATE WHETHER COST INDICATED IS TO BE ADDED TO OR DEDUCTED FROM THE BASE BID COST. FAILURE TO CLEARLY STATE SAME WILL BE GROUNDS FOR DISQUALIFICATION OF THE BIDDER.

ALL WORK INCLUDED UNDER THIS HEADING SHALL BE SUBJECT TO THE GENERAL CONDITIONS OF THE PROJECT. ALL CONSTRUCTION, WORKMANSHIP AND FINISHES REQUIRED BY THE ALTERNATES SHALL BE AS SPECIFIED IN THE APPLICABLE SECTIONS OF THE SPECIFICATIONS MANUAL. THE UNDERSIGNED PROPOSES AND AGREES THAT SHOULD THE FOLLOWING ALTERNATES BE ACCEPTED AND INCLUDED IN THE CONTRACT, THE AMOUNT OF THE TOTAL BASE BID WILL BE REVISED AS FOLLOWS. THE UNDERSIGNED FURTHER AGREES THAT SHOULD THE FOLLOWING ALTERNATES BE ACCEPTED, THE ALTERNATE BID PRICES INDICATED SHALL BE HELD AND HONORED FOR A PERIOD OF ONE YEAR FROM THE DATE OF CONTRACT SIGNING.

SCHEDULE OF ALTERNATES:

NUMBER	DESCRIPTION	COST
(Add) **ALT-1: METAL WALL PANEL INSTALLATION**	**PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, AND COORDINATION NECESSARY TO REHABILITATE THE AUDITORIUM ENTRY IN CORRIDOR 200N. THIS ALTERNATE INCLUDES THE INSTALLATION OF NEW ACOUSTIC METAL WALL PANEL SYSTEMS OVER EXISTING BRICK MASONRY AND ADJACENT WALL CONDITIONS. THIS ALTERNATE ALSO INCLUDES RECESSED WALL OPENINGS SIZED AND LOCATED TO RECEIVE TV DISPLAYS (BY OTHERS). RECESSED OPENINGS SHALL BE FULLY COORDINATED WITH WALL PANEL MODULE SIZING, JOINT LOCATIONS, AND SPACING SUCH THAT THE PANEL LAYOUT ALIGNS CLEANLY WITH RECESS EDGES AND MAINTAINS A COHESIVE WALL COMPOSITION. WORK INCLUDES ALL REQUIRED FRAMING, BACKING, TRIMS, ATTACHMENTS, AND FINISH TRANSITIONS NECESSARY TO INTEGRATE THE ACOUSTIC WALL PANELS AND RECESSED TV OPENINGS INTO A COMPLETE AND COORDINATED INSTALLATION. TV DISPLAYS AND MOUNTING HARDWARE BY OTHERS. COORDINATE POWER, DATA, AND AUDIOVISUAL SYSTEMS WITH CONTRACT E.**	($)

SITE SUPERVISION

THE SUCCESSFUL CONTRACTOR IS TO PROVIDE FULL TIME SITE SUPERVISION FOR THEIR STAFF, SUBCONTRACTORS AND SUPPLIERS FOR THE DURATION OF THIS PROJECT. A COMPETENT SUPERINTENDENT SHALL BE IN ATTENDANCE AT THE JOB SITE AT ALL TIMES WHEN WORK IS BEING PERFORMED UNDER THEIR CONTRACT. THE SUPERINTENDENT IS RESPONSIBLE TO VISIT THE JOB SITE DAILY WHEN WORK IS NOT BEING PERFORMED UNDER THEIR CONTRACT AND TO MONITOR THE OVERALL CONSTRUCTION PROGRESS. A QUALIFIED SITE SUPERINTENDENT MUST HAVE THE AUTHORITY TO REPRESENT AND MAKE DECISIONS FOR THEIR COMPANY WITH REGARDS TO THE SUBJECT JOB, MUST BE ABLE TO GIVE GUIDANCE AND DIRECTION TO EMPLOYEES, SUBCONTRACTORS AND SUPPLIERS, AND MUST BE KNOWLEDGEABLE ABOUT THE WORK TO BE PROVIDED. FAILURE TO PROVIDE A QUALIFIED SITE SUPERINTENDENT AT THE JOB SITE SHALL SUBJECT SAID PRIME CONTRACTOR TO A PENALTY OF $1,000 PER DAY FOR EVERY OCCURRENCE.

TIME OF COMPLETION

WHILE THE SCHOOL IS OCCUPIED, ALL WORK UNDER THIS CONTRACT SHALL BE PERFORMED DURING AFTER-SCHOOL HOURS (3:00 PM - 11:00 PM). WHILE THE SCHOOL IS UNOCCUPIED DURING HOLIDAYS & WEEKENDS, ALL WORK UNDER THIS CONTRACT MAY BE PERFORMED DURING NORMAL BUSINESS HOURS (7:00AM - 3:00PM), PENDING ACCEPTANCE BY OWNER. BASED UPON THESE HOURS, THE PROJECT SHALL BE COMPLETED IN ACCORDANCE WITH THE FOLLOWING DATES:

WORKDAYS:	**Monday - Friday**
UNOCCUPIED WORK HOURS (SUMMER, WEEKENDS, HOLIDAYS):	**7:00 AM - 3:00 PM**
OCCUPIED WORK HOURS:	**3:00 PM – 11:00 PM**
CONSTRUCTION START DATE:	**June 30, 2026**
SUBSTANTIAL COMPLETION:	**January 19, 2027**
FINAL COMPLETION:	**February 22, 2027**

IF NECESSARY, WEEKEND, HOLIDAY AND EVENING WORK SHALL BE PROVIDED TO ENSURE THE COMPLETION DATES LISTED ABOVE, AT THE SOLE COST AND EXPENSE OF THE BIDDER.

FAILURE OF THE CONTRACTOR TO COMPLETE ALL WORK SHOWN AND SPECIFIED IN THE CONTRACT DOCUMENTS, BY ALL OF THE SPECIFIED TIME FRAMES, SHALL SUBJECT THE CONTRACTOR TO LIQUIDATED DAMAGES, AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, IN THE SUM OF ONE THOUSAND

DOLLARS ($1,000.00) PER CALENDAR DAY. SUCH DAMAGES WILL COMMENCE ON THE DAY AFTER THE COMPLETION DATE OR THE DAY AFTER ANY LISTED MILESTONE DATE IN THE CONTRACT DOCUMENTS.

WITHIN TEN (10) CONSECUTIVE CALENDAR DAYS AFTER THE DATE OF THE NOTICE OF AWARD, THE BIDDER SHALL EXECUTE THE CONTRACT AND FURNISH THE REQUIRED PERFORMANCE BOND, PAYMENT BOND AND PROOF OF THE REQUIRED INSURANCES.

THE BOARD OF EDUCATION OF THE SCHOOL DISTRICT RESERVES THE RIGHT TO AWARD THIS CONTRACT TO OTHER THAN THE LOW BIDDER IF THE LAW SO PERMITS.

ADDENDUM NO.	DATED

SPECIFIC DAMAGES WILL BE ASSESSED AND DEDUCTED FROM AMOUNTS OTHERWISE DUE THE CONTRACTOR FOR ADDITIONAL INSPECTION (FIELD) AND CONTRACT ADMINISTRATION (OFFICE) TIME EXPENDED BY THE ARCHITECT/ENGINEER AND/OR OTHER CONSTRUCTION EMPLOYEE(S) HIRED TO ADMINISTER OR OBSERVE THE CONTRACT, SHOULD THE CONTRACTOR COMPLETE THE CONTRACT BEYOND THE CONTRACT COMPLETION PERIOD SPECIFIED ABOVE.

THE REQUIREMENTS OF THE PROPOSAL HAVE BEEN COMPLETELY READ, UNDERSTOOD AND ACKNOWLEDGED BY THE BIDDER.

BIDDER: _____

BIDDER'S ADDRESS: _____

SIGNED BY: _____ **TITLE:** _____

DATE: _____

Telephone number where the contractor or a competent representative can accept a telephone message and provide a reasonable reply as soon as possible, but not later than twenty-four (24) hours:

DAYTIME: _____ NIGHTTIME: _____

FAX: _____

FEDERAL I.D

CONTRACT M - HVAC CONSTRUCTION

Note: The bidder is asked to use either black ink or typewriter (black ribbon) in completing this proposal form. Each line-item amount must be completed. Failure to do so will be grounds for the disqualification of the bidder.

ITEM 1 – BONDS and INSURANCES

(written in words) _____($)

ITEM 2 – DIVISION 1 – GENERAL REQUIREMENTS

(written in words) _____($)

ITEM 3 – DIVISION 1 – PROJECT SUPERVISION

(written in words) _____($)

ITEM 4 – DIVISION 2 – EXISTING CONDITIONS & DEMOLITION WORK

(written in words) _____($)

ITEM 5 – DIVISION 7 – FIRE STOPPING

(written in words) _____($)

ITEM 6 – DIVISION 23 – PIPE, VALVES, FITTINGS, PIPE HANGERS AND SUPPORTS

(written in words)_____ ($)

ITEM 7 – DIVISION 23 – MECHANICAL SYSTEM IDENTIFICATION

(written in words)_____ ($)

ITEM 8 – DIVISION 23 – BALANCING OF AIR SYSTEMS

(written in words)_____ ($)

ITEM 9 – DIVISION 23 – PIPING & DUCTWORK INSULATION

(written in words)_____ ($)

ITEM 10 – DIVISION 23 – CONTROLS

(written in words) _____($)

ITEM 11 – DIVISION 23 – SHEET METAL WORK

(written in words)_____ ($)

ITEM 12 – DIVISION 23 – AIR COOLED SPLIT SYSTEMS

(written in words) _____ ($)

ITEM 13 – AS-BUILT DRAWINGS

(written in words) _____($)

ITEM 14 – PROJECT CLOSEOUT

(written in words) _____($)

ITEM 15 - ALLOWANCE H1 – CASH ALLOWANCE FOR CONTINGENCY

For use according to the owner's instructions, see section 012100.

(written in words) Fifty Thousand Dollars **($ 50,000)**

CONTRACT H – TOTAL HVAC CONSTRUCTION BASE BID INCLUDING ALLOWANCE (ITEMS 1-15)

(written in words) _____($)

Note: The Port Chester Rye Union Free School District is exempt from Federal, New York State and local taxes. TOTAL AMOUNT BID shall be exclusive of all taxes.

LEGITIMATE CONSTRUCTION NEED SHALL INCLUDE, BUT NOT BE LIMITED TO:

A CHANGE IN PROJECT SPECIFICATIONS,

A CHANGE IN CONSTRUCTION MATERIAL COSTS,

A CHANGE IN SUBCONTRACTOR STATUS, OR

THE SUBCONTRACTOR HAS BECOME UNWILLING, UNABLE OR UNAVAILABLE TO PERFORM THE SUBCONTRACT.

PAYMENTS TO SUBCONTRACTORS AND MATERIAL MEN MUST BE MADE WITHIN 7 CALENDAR DAYS OF THE RECEIPT OF PAYMENT FROM THE PUBLIC OWNER. FAILURE TO PAY SUBCONTRACTORS ON TIME MAY RESULT IN THE SUBCONTRACTORS BEING ENTITLED TO INTEREST FROM THE CONTRACTOR ON THE SUM DUE FOR ALL CALENDAR DAYS SUBSEQUENT TO THE SEVENTH DAY THROUGH THE DATE THAT PAYMENT IS MADE.

THE BIDDER UNDERSTANDS THAT THE OWNER RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS AND TO WAIVE ANY INFORMALITIES IN THE BIDDING.

THE BIDDER AGREES THAT THE BID SHALL BE GOOD AND MAY NOT BE WITHDRAWN FOR A PERIOD OF FORTY-FIVE (45) CALENDAR DAYS AFTER THE OPENING OF BIDS.

THE BIDDER IS REQUIRED TO VISIT THE SITE FOR A FIELD SURVEY TO VERIFY THE SCOPE OF WORK PRIOR TO BID SUBMISSION.

THE BIDDER HAS SUBMITTED ALL REQUESTS FOR OTHER BRAND NAMES OR PRODUCTS NOT LISTED IN THE SPECIFICATIONS IN ACCORDANCE WITH ARTICLES 6(V) AND 6(W) OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION.

SITE SUPERVISION

THE SUCCESSFUL CONTRACTOR IS TO PROVIDE FULL TIME SITE SUPERVISION FOR THEIR STAFF, SUBCONTRACTORS AND SUPPLIERS FOR THE DURATION OF THIS PROJECT. A COMPETENT SUPERINTENDENT SHALL BE IN ATTENDANCE AT THE JOB SITE AT ALL TIMES WHEN WORK IS BEING PERFORMED UNDER THEIR CONTRACT. THE SUPERINTENDENT IS RESPONSIBLE TO VISIT THE JOB SITE DAILY WHEN WORK IS NOT BEING PERFORMED UNDER THEIR CONTRACT AND TO MONITOR THE OVERALL CONSTRUCTION PROGRESS. A QUALIFIED SITE SUPERINTENDENT MUST HAVE THE AUTHORITY TO REPRESENT AND MAKE DECISIONS FOR THEIR COMPANY WITH REGARDS TO THE SUBJECT JOB, MUST BE ABLE TO GIVE GUIDANCE AND DIRECTION TO EMPLOYEES, SUBCONTRACTORS AND SUPPLIERS, AND MUST BE KNOWLEDGEABLE ABOUT THE WORK TO BE PROVIDED. FAILURE TO PROVIDE A QUALIFIED SITE SUPERINTENDENT AT THE JOB SITE SHALL SUBJECT SAID PRIME CONTRACTOR TO A PENALTY OF $1,000 PER DAY FOR EVERY OCCURRENCE.

TIME OF COMPLETION

WHILE THE SCHOOL IS OCCUPIED, ALL WORK UNDER THIS CONTRACT SHALL BE PERFORMED DURING AFTER-SCHOOL HOURS (3:00 PM - 11:00 PM). WHILE THE SCHOOL IS UNOCCUPIED DURING HOLIDAYS & WEEKENDS, ALL WORK UNDER THIS CONTRACT MAY BE PERFORMED DURING NORMAL BUSINESS HOURS (7:00AM - 3:00PM), PENDING ACCEPTANCE BY OWNER. BASED UPON THESE HOURS, THE PROJECT SHALL BE COMPLETED IN ACCORDANCE WITH THE FOLLOWING DATES:

WORK DAYS:	**Monday - Friday**
UNOCCUPIED WORK HOURS (SUMMER, WEEKENDS, HOLIDAYS):	**7:00 AM - 3:00 PM**
OCCUPIED WORK HOURS:	**3:00 PM – 11:00 PM**
CONSTRUCTION START DATE:	**June 30, 2026**
SUBSTANTIAL COMPLETION:	**January 19, 2027**
FINAL COMPLETION:	**February 22, 2027**

IF NECESSARY, WEEKEND, HOLIDAY AND EVENING WORK SHALL BE PROVIDED TO ENSURE THE COMPLETION DATES LISTED ABOVE, AT THE SOLE COST AND EXPENSE OF THE BIDDER.

FAILURE OF THE CONTRACTOR TO COMPLETE ALL WORK SHOWN AND SPECIFIED IN THE CONTRACT DOCUMENTS, BY ALL OF THE SPECIFIED TIME FRAMES, SHALL SUBJECT THE CONTRACTOR TO LIQUIDATED DAMAGES, AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, IN THE SUM OF ONE THOUSAND

DOLLARS ($1,000.00) PER CALENDAR DAY. SUCH DAMAGES WILL COMMENCE ON THE DAY AFTER THE COMPLETION DATE OR THE DAY AFTER ANY LISTED MILESTONE DATE IN THE CONTRACT DOCUMENTS.

WITHIN TEN (10) CONSECUTIVE CALENDAR DAYS AFTER THE DATE OF THE NOTICE OF AWARD, THE BIDDER SHALL EXECUTE THE CONTRACT AND FURNISH THE REQUIRED PERFORMANCE BOND, PAYMENT BOND AND PROOF OF THE REQUIRED INSURANCES.

THE BOARD OF EDUCATION OF THE SCHOOL DISTRICT RESERVES THE RIGHT TO AWARD THIS CONTRACT TO OTHER THAN THE LOW BIDDER IF THE LAW SO PERMITS.

ADDENDUM NO.	DATED

SPECIFIC DAMAGES WILL BE ASSESSED AND DEDUCTED FROM AMOUNTS OTHERWISE DUE THE CONTRACTOR FOR ADDITIONAL INSPECTION (FIELD) AND CONTRACT ADMINISTRATION (OFFICE) TIME EXPENDED BY THE ARCHITECT/ENGINEER AND/OR OTHER CONSTRUCTION EMPLOYEE(S) HIRED TO ADMINISTER OR OBSERVE THE CONTRACT, SHOULD THE CONTRACTOR COMPLETE THE CONTRACT BEYOND THE CONTRACT COMPLETION PERIOD SPECIFIED ABOVE.

THE REQUIREMENTS OF THE PROPOSAL HAVE BEEN COMPLETELY READ, UNDERSTOOD AND ACKNOWLEDGED BY THE BIDDER.

BIDDER: _____

BIDDER'S ADDRESS: _____

SIGNED BY: _____ **TITLE:** _____

DATE: _____

Telephone number where the contractor or a competent representative can accept a telephone message and provide a reasonable reply as soon as possible, but not later than twenty-four (24) hours:

DAYTIME: _____ NIGHTTIME: _____

FAX: _____

FEDERAL I.D

CONTRACT E - ELECTRICAL CONSTRUCTION

Note: The bidder is asked to use either black ink or typewriter (black ribbon) in completing this proposal form. Each line-item amount must be completed. Failure to do so will be grounds for disqualification of the bidder.

ITEM 1 - BONDS and INSURANCES

(written in words) _____($)

ITEM 2 – DIVISION 1 – GENERAL REQUIREMENTS

(written in words)_____($)

ITEM 3 – DIVISION 1 – PROJECT SUPERVISION

(written in words) _____($)

ITEM 4 - DIVISION 26 – Electrical

(written in words) _____($)

ITEM 5 – DIVISION 26 – Electrical Demolition

(written in words)_____($)

ITEM 6 – DIVISION 26 – Low-Voltage Electrical Power Conductors and Cables

(written in words) _____($)

ITEM 7 – DIVISION 26 – Grounding and Bonding for Electrical Systems

(written in words) _____($)

ITEM 8 – DIVISION 26 – Hangers and Supports for Electrical Systems

(written in words) _____($)

ITEM 9 – DIVISION 26 – Raceways and Boxes for Electrical Systems

(written in words) _____($)

ITEM 10 – DIVISION 26 – Identification for Electrical Systems

(written in words) _____($)

ITEM 11 - DIVISION 26 – Panelboards

(written in words) _____($)

ITEM 12 - DIVISION 26 – Wiring Devices

(written in words) _____($)

ITEM 13 - DIVISION 26 – Enclosed Switched and Circuit Breakers

(written in words) _____($)

ITEM 14 - DIVISION 26 – Lighting

(written in words) _____($)

ITEM 15 - DIVISION 26 – Fire Detection and Alarm

(written in words) _____($)

ITEM 16 - ALLOWANCE E1 – CASH ALLOWANCE FOR CONTINGENCY

For use according to owner's instructions, see section 012100.

(written in words) **SEVENTY-FIVE THOUSAND DOLLARS AND ZERO CENTS** **($ 75,000.00)**

CONTRACT E – TOTAL ELECTRICAL CONSTRUCTION BASE BID INCLUDING ALLOWANCE (ITEMS 1-16)

(written in words) _____($)

Note: The Port Chester Rye Union Free School District is exempt from Federal, New York State and local taxes. TOTAL AMOUNT BID shall be exclusive of all taxes.

LEGITIMATE CONSTRUCTION NEED SHALL INCLUDE, BUT NOT BE LIMITED TO:

A CHANGE IN PROJECT SPECIFICATIONS,

A CHANGE IN CONSTRUCTION MATERIAL COSTS,

A CHANGE IN SUBCONTRACTOR STATUS, OR

THE SUBCONTRACTOR HAS BECOME UNWILLING, UNABLE OR UNAVAILABLE TO PERFORM THE SUBCONTRACT.

PAYMENTS TO SUBCONTRACTORS AND MATERIAL MEN MUST BE MADE WITHIN 7 CALENDAR DAYS OF THE RECEIPT OF PAYMENT FROM THE PUBLIC OWNER. FAILURE TO PAY SUBCONTRACTORS ON TIME MAY RESULT IN THE SUBCONTRACTORS BEING ENTITLED TO INTEREST FROM THE CONTRACTOR ON THE SUM DUE FOR ALL CALENDAR DAYS SUBSEQUENT TO THE SEVENTH DAY THROUGH THE DATE THAT PAYMENT IS MADE.

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TIME OF COMPLETION

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DOLLARS ($1,000.00) PER CALENDAR DAY. SUCH DAMAGES WILL COMMENCE ON THE DAY AFTER THE COMPLETION DATE OR THE DAY AFTER ANY LISTED MILESTONE DATE IN THE CONTRACT DOCUMENTS.

WITHIN TEN (10) CONSECUTIVE CALENDAR DAYS AFTER THE DATE OF THE NOTICE OF AWARD, THE BIDDER SHALL EXECUTE THE CONTRACT AND FURNISH THE REQUIRED PERFORMANCE BOND, PAYMENT BOND AND PROOF OF THE REQUIRED INSURANCES.

THE BOARD OF EDUCATION OF THE SCHOOL DISTRICT RESERVES THE RIGHT TO AWARD THIS CONTRACT TO OTHER THAN THE LOW BIDDER IF THE LAW SO PERMITS.

ADDENDUM NO.	DATED

SPECIFIC DAMAGES WILL BE ASSESSED AND DEDUCTED FROM AMOUNTS OTHERWISE DUE THE CONTRACTOR FOR ADDITIONAL INSPECTION (FIELD) AND CONTRACT ADMINISTRATION (OFFICE) TIME EXPENDED BY THE ARCHITECT/ENGINEER AND/OR OTHER CONSTRUCTION EMPLOYEE(S) HIRED TO ADMINISTER OR OBSERVE THE CONTRACT, SHOULD THE CONTRACTOR COMPLETE THE CONTRACT BEYOND THE CONTRACT COMPLETION PERIOD SPECIFIED ABOVE.

THE REQUIREMENTS OF THE PROPOSAL HAVE BEEN COMPLETELY READ, UNDERSTOOD AND ACKNOWLEDGED BY THE BIDDER.

BIDDER: _____

BIDDER'S ADDRESS: _____

SIGNED BY: _____ **TITLE:** _____

DATE: _____

Telephone number where the contractor or a competent representative can accept a telephone message and provide a reasonable reply as soon as possible, but not later than twenty-four (24) hours:

DAYTIME: _____ NIGHTTIME: _____

FAX: _____

FEDERAL I.D

Your insurance representative must complete the form below to be considered for the award of this bid or project, and it is important that you complete the Bidder's Acknowledgement section of this form. Please note that this Insurance Certification must accompany your bid submission for your bid to be considered.

Insurance Representative's Acknowledgement:

We have reviewed the insurance requirements set forth in Article 10 of the General Conditions of the Contract of Construction and in the Supplementary Conditions Article 10 & 11 of the specifications and can provide 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's Signature

Bidder's Acknowledgement:

I acknowledge that I have reviewed 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 to this bidder. I understand that this Insurance Certification form must be submitted with my bid and my inability to provide the required insurances may result in the rejection of my bid as nonresponsive, and the Port Chester Rye Union Free School District may award the contract to the next lowest/responsive bidder.

Name: _____

Address: _____

_____

Date: _____ _____

Bidder's Signature

NON-COLLUSIVE FORM BIDDING CERTIFICATE
BID PROPOSAL CERTIFICATIONS

Firm Name _____

Business Address _____

Telephone Number _____ Date of Bid _____

I. General Bid Certification

The bidder certifies that the bidder will furnish, at the prices quoted, the materials, equipment and/or services as proposed on this Bid.

II. Non-Collusive Bidding Certification

The following statement is made pursuant to Section 103-D of the General Municipal Law, as amended to date, and Section 139-D of the State Finance Law, as amended to date, and Section 2604 of the Public Authorities Law, as amended to date.

By submission of this bid proposal, the bidder certifies that he/she is complying with Section 103-d of the General Municipal Law as follows:

Statement of non-collusion in bids and proposals to political subdivision of the state. Every bid or proposal hereafter made to a political subdivision of the state or any public department, agency or official thereof where competitive bidding is required by statute, rule, regulation, or local law, for work or services performed or to be performed or goods sold or to be sold, shall contain the following statement subscribed by the bidder and affirmed by such bidder as true under the penalties of perjury:

Non-collusive bidding certification.

(a) By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief:

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

2. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be

disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and,

3. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

(b) A bid shall not be considered for award nor shall any award be made where (a)(1), (2), and (3) above have not been complied with; provided, however, that if in any case the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish the reasons therefor. Where (a) (1), (2), and (3) above have not been complied with, the bid shall not be considered for award nor shall any award be made unless the head of the purchasing unit of the political subdivision, public department, agency or official thereof to which the bid is made or such person's designee determines that such disclosure was not made for the purpose of restricting competition.

The fact that a bidder (a) has published price lists, rates, or tariffs covering items being procured, (b) has informed prospective customers of proposed or pending publication of new or revised price lists for such items, or (c) has sold the same items to other customers at the same prices being bid, does not constitute, without more, a disclosure within the meaning of subparagraph (a)(1).

(c) Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, and where such bid contains the certifications referred to in subdivision II of this section, shall be deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing, and submission of the bid and the inclusion therein of the certificate as to non-collusion as the act and deed of corporation.

(d) The person signing this Bid or Proposal certifies that he has fully informed himself/herself regarding the accuracy of the statements contained in this certification, and under the penalties of perjury, affirms the truth thereof, such penalties being applicable to the Bidder as well to the person signing on behalf of the Bidder.

Name of Bidder: _____

Signature of Bidder: _____
(Signature of Bidder or authorized representative of a corporation)

Title of Person Signing for Bidder: _____

Sworn to before me this _____ day of_____, 20_____

Signature of Notary Stamp/Seal of Notary

HOLD HARMLESS AGREEMENT

In accordance with Article 12 of the General Conditions, Indemnification, the Contractor will be required to sign the following "Hold Harmless" Agreement with the BOARD OF EDUCATION. Compliance with the requirements for insurance shall not relieve the Contractor from liability set forth under this Hold Harmless Agreement.

The undersigned hereby agrees to defend, indemnify, and save harmless the BOARD OF EDUCATION, its officers and employees from and against any and all liability, loss, damages, claims for bodily injury and/or property damages, cost and expense, including counsel fees, to the extent permissible by law, that may occur or that may be alleged to have occurred in the course of the performance of the agreement awarded to the undersigned as a result of this bid by the undersigned or the undersigned's officers, directors, employees, subcontractors and agents, whether such claims shall be made by an employee of the undersigned or by a third party, the undersigned covenants and agrees that undersigned will pay all costs and expenses arising therefrom and in connection therewith, and if any judgment shall be rendered against the Owner, Architect/Engineer and/or Construction Manager, in any such litigation, the undersigned shall at the undersigned's own expense satisfy and discharge the same.

Bidder Name: _____

By: _____
(Signature of Authorized Representative of Corporation)

_____
(Print Name and Title)

_____
(Date)

CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

As a result of the Iran Divestment Act of 2012 (the "Act"), Chapter 1 of the 2012 Laws of New York, a new provision has been added to State Finance Law (SFL) § 165-a and New York General Municipal Law § 103-g, both effective April 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) has developed 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 list is 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 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 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 they have 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 extension, renewal or assignment for a Bidder/Contractor that appears on the Prohibited Entities List prior to the award of the contract or prior to the contract's renewal, extension or assignment 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 I am the

_____ of the _____ (name of entity)

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

_____

(SIGNED)

SWORN to before me this _____ day of _____, 20_____

Notary Public: _____

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

Bidders shall complete this form if they cannot certify that the bidder /contractor or any proposed subcontractor is not identified on the Prohibited Entities List. The School 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 I am the _____of

the _____(name of entity) and the foregoing is true and accurate.

_____
SIGNED

SWORN to before me this _____day of _____, 20____

Notary Public: _____

PORT CHESTER RYE UNION FREE SCHOOL DISTRICT
MIDDLE SCHOOL AUDITORIUM RENOVATION

SEXUAL HARASSMENT CERTIFICATION

The following certification must be submitted with all bids submitted after January 1, 2019 pursuant to N.Y. State Finance Law § 139-1(1)(a).

"By submission of this bid/proposal, each Bidder and each person signing on behalf of any Bidder certifies, and in the case of a joint bid each party thereto certifies its own organization, under penalty of perjury, that the Bidder has and has implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all of its employees. Such policy shall, at a minimum, meets the requirements of Section 201-g of the Labor Law."

Dated: _____

_____
(Signature Here)

_____
(Signatory's Name Printed)

_____
(Name of Bidder)

Labor Law 220-i Certification Form

-Sign and Submit with Bid-

By submission of this bid, the person authorized to sign on behalf of the Bidder hereby certifies, under penalty of perjury, that: (i) the Bidder is registered with the New York State Department of Labor pursuant to Section 220-i of the New York Labor Law and (ii) each of the subcontractors engaged by the Bidder for this Project are also registered.

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

Project: _____

Bidder Name (Corporate): _____

Bidder Address: _____

Signature of Corporate Officer: _____

Print Name and Title: _____

Date: _____

Sworn to before me this _____
day of _____, 20____

_____
Notary Public

List of Subcontractors

The Bidder shall list the subcontractors, if any, to be used for this project. Provide the required information for each proposed subcontractor. Make appropriate copies of this form should the Bidder propose more than five (5) subcontractors. List at least five projects for each subcontractor that demonstrates the subcontractor's qualifications to perform the work of the project. The projects shall be similar size and complexity and have been completed within the last five (5) years by the subcontractor.

(NOTE THIS FORM MUST BE COMPLETED BY BIDDER)

Subcontractor Name: _____

Type of Work: _____

Owner	Contact Name	Phone Number	Location	Contract Amount

Subcontractor Name: _____

Type of Work: _____

Owner	Contact Name	Phone Number	Location	Contract Amount

Subcontractor Name: _____

Type of Work: _____

Owner	Contact Name	Phone Number	Location	Contract Amount

Subcontractor Name: _____

Type of Work: _____

Owner	Contact Name	Phone Number	Location	Contract Amount

Subcontractor Name: _____

Type of Work: _____

Owner	Contact Name	Phone Number	Location	Contract Amount

AGREEMENT made as of the ___day of _____in the year of **Two Thousand and Twenty-six.**

BETWEEN the Owner (Name and address)	**Port Chester Rye Union Free School District** 113 Bowman Avenue Rye Brook, New York 10573
and the Contractor: (Name and address)	Contractor's Name Address Line 1 Address Line 2
The Project is: (Name and location)	**AUDITORIUM UPGRADES FOR PORT CHESTER MIDDLE SCHOOL** **SED CONTROL #: 66-19-04-03- 0-013-030** **CONTRACT G – GENERAL CONSTRUCTION WORK** **CONTRACT M – HVAC CONSTRUCTION WORK** **CONTRACT E – ELECTRICAL CONSTRUCTION WORK**
The Architect is: (Name and address)	**H2M architects + engineers** 1133 Westchester Avenue Suite N-210 White Plains, NY 10605
The Construction Manager is: (Name and address)	TBD Address Line 1 Address Line 2

The Owner and Contractor agree as set forth below.

ARTICLE 1
THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General Conditions, Special Provisions and other Conditions), Drawings, specifications, Addenda issued prior to execution of this Agreement, the Bidding documents, other documents listed in Article 9 of this Agreement and Modifications issued after execution of this Agreement. The Bidding Documents are comprised of all bid-related documents including, but not limited to, the Notice to Bidders, the Instructions to Bidders, Bid Proposal Form. The Contract Documents form the Contract and are 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. A "Modification" is (1) a written amendment to the agreement between the Owner and Contractor 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 (e.g., Field Order).

ARTICLE 2
THE WORK OF THIS CONTRACT

The Contractor shall execute the entire General Construction Work including electrical and mechanical construction described in the Contract Documents or reasonably inferable by the Contractor as necessary to produce the results intended by the Contract Documents, except to the extent 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 General Construction (including electrical and mechanical) work and substantial completion of the work of this contract shall be in accordance with Specification Section 004116 Proposal Forms (PB - G), (PB - E), and (PB - H).

3.2 Time is of the essence respecting the Contract Documents and all obligations thereunder.

3.3 Upon the execution of this Agreement, the Contractor shall provide the Owner with copies of all contracts entered into between the Contractor and subcontractors, including material suppliers. The Contractor's obligation to provide the Owner with said contracts shall continue for the duration of the Project.

ARTICLE 4
CONTRACT SUM

4.1 The Owner shall pay the Contractor in current funds for the Contractor's performance of the Contract the Contract Sum of **___Dollars and _Cents (dollar amount),** subject to additions and deductions as provided in the Contract Documents.

4.2 The Contract Sum includes the following alternates, if any, which are described in the Bid Proposal Form (attached hereto) and are hereby accepted by the Owner, if any: Not Applicable

4.3 The Contract Sum includes the following allowances:
Allowance G-1: $ 150,000.00
Allowance M-1: $ 50,000.00
Allowance E-1: $ 75,000.00

4.4 Unit prices are as follows: **N/A**

4.5 Alternates are as follows:
ALT-1: METAL WALL PANEL INSTALLATION

ARTICLE 5
PROGRESS PAYMENTS

5.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued 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.

5.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month.

All progress payments shall be based upon an estimate and a certificate, made by the Architect, of the materials furnished, installed and suitably stored at the site and the work done by the Contractor, and payment shall be made in installments of ninety-five percent (95%) of the amount certified as earned so that, at the completion of the work, there will be a retainage of five percent (5%) of the Total Contract Sum. Retainage shall be paid to the Contractor upon substantial completion of the Work of this Contract less 200 percent of the value of the items that remain to be completed and/or corrected, less any sums Owner is required to retain for any public improvement lien(s) filed against the Contractor's contract funds and less any sum Owner is required to retain or pay to a third party pursuant to an order of any Court or governmental authority with jurisdiction over the Owner, Contractor or the Project site (e.g., New York Department of Labor

All progress payments made previous to the last and final payment shall be based on estimates and the right is hereby reserved by the Architect for the Owner to make all due and proper corrections in any payment for any previous error.

The Contractor shall submit with each application for payment the following:

1. A current Sworn Statement from the Contractor setting forth all subcontractors, including material suppliers, with whom the Contractor has subcontracted, the amount of such subcontract, the amount requested for any subcontractor, including material suppliers, in the application for payment and the amount to be paid to the Contractor from such progress payment;

2. Commencing with the second (2nd) Application for Payment submitted by the Contractor, duly executed so-called "after the fact" waivers of mechanics' and material suppliers' liens from all subcontractors, including material suppliers, and, when appropriate, from lower tier subcontractors establishing receipt of payment or satisfaction of payment of all amounts requested on behalf of such entities and disbursed prior to submittal by the Contractor of the current Application for Payment, plus sworn statements from all subcontractors, including material suppliers and, where appropriate, from lower tier subcontractors, covering all amounts described in this Paragraph 5.2; and

3. Such other information, documentation and materials as the Owner or the Architect may require.

5.3 Payment shall not be released to the Contractor until the Owner receives the following documentation:

1. Certified payroll for employees of Contractor, employees of subcontractors and, when applicable, employees of sub-subcontractors, who are performing or have performed work on the Project.

2. Copies of invoices submitted to the Contractor by its subcontractors, including material suppliers.

ARTICLE 6
FINAL PAYMENT

Final payment, constituting the entire unpaid balance of the Contract Sum, less any sums Owner is required to retain for any public improvement lien(s) filed against the Contractor's contract funds and less any sum Owner is required to retain or pay to a third party pursuant to an order of any Court or governmental authority with jurisdiction over the Owner, Contractor or the Project site (e.g., New York Department of Labor), shall be made by the Owner to the Contractor when (1) the Contract has been fully performed including compliance with all provisions of the Contract Documents except for

the Contractor's responsibility to correct nonconforming Work under Article 15(B) of the General Conditions and to satisfy other requirements, if any, which necessarily survive final payment; and (2) a final Certificate for Payment has been issued by the Architect. Final payment shall be made by the Owner not more than 30 days after the issuance of the Architect's final Certificate for Payment, or as soon thereafter as is practicable.

ARTICLE 7
MISCELLANEOUS PROVISIONS

7.1 Where reference is made in this Agreement to a provision of the General Conditions or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

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

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

2. that it is able to furnish the plant, tools, materials, supplies, equipment and labor required to complete the Work and perform its obligations hereunder;

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

4. that its execution of this Agreement and its performance thereof is within its duly authorized powers;

5. that its duly authorized representative has visited the site of the Project, is familiar with the local and special conditions under which the Work is to be performed and has correlated on-site observations with the requirements of the Contact Documents;

6. that it possesses a high level of experience and expertise in the business administration, construction, construction management and superintendence of projects of the size, complexity and nature of the particular Project, and that it will perform the Work with the care, skill and diligence of such a contractor;

7. that it has insurance coverage that complies with the requirements of Article 10 of the General Conditions of the Contract for Construction as set forth in the Project Manual; and

8. that it has or will ensure that all subcontractors it has or will retain have insurance coverage that complies with the applicable requirements of Article 10 of the General Conditions of the Contract for Construction as set forth in the Project Manual.

7.3 The foregoing warranties are in addition to, and not in lieu of, any and all other liability imposed upon the Contractor by law with respect to the Contractor's duties, obligations and performance hereunder. The Contractor's liability hereunder shall survive the Owner's final acceptance of and payment for the Work. All representations and warranties set forth in this Agreement, including without limitation, this Article 7, shall survive the final completion of the Work or the earlier termination of this Agreement. The Contractor acknowledges that the Owner is relying upon the Contractor's skill and experience in connection with the Work

called for hereunder.

ARTICLE 8
TERMINATION OR SUSPENSION

1.1 The Contract may be terminated by the Owner as provided in the General Conditions.

1.2 The Work may be suspended by the Owner as provided in the General Conditions.

ARTICLE 9
ENUMERATION OF CONTRACT DOCUMENTS

9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated as follows:

9.1.1 The Agreement is this executed Agreement Between Owner and Contractor.

9.1.2 The General Conditions are the General Conditions of the Contract for Construction as set forth in the Project Manual.

9.1.3 The Specifications are as set forth in the Project Manual and indexed in **Exhibit "A"** hereto.

9.1.4 The Drawings are those as indexed in **Exhibit "B"** hereto.

9.1.5 The Addenda, if any, are as follows:

Addendum ( ) – (date)

This Agreement is entered into as of the day and year first written above and is executed in at least four original copies of which one is to be delivered to the Contractor, one to the Architect for use in the administration of the Contract, and the remainder to the Owner.

OWNER	**CONTRACTOR**
Port Chester Rye Union Free School District 11 Bowman Ave Rye Brook, NY 10573	**Contractor Name** Address Line 1 Address Line 2
By_____ (Signature)	By_____ (Signature)
_____ (Printed name and title)	_____ (Printed name and title)

EXHIBIT 'A' – List of Specifications

Port Chester Rye Union Free School District

AUDITORIUM UPGRADES FOR PORT CHESTER MIDDLE SCHOOL

Port Chester Middle School - SED Control No. 66-19-04-03-0-013-030

CONTRACT G – GENERAL CONTRUCTION WORK
CONTRACT M – HVAC CONSTRUCTION WORK
CONTRACT E – ELECTRICAL CONSTRUCTION WORK

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000101	SPECIFICATION COVER
000102	TABLE OF CONTENTS
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002113	INSTRUCTIONS FOR BIDDERS
002115	RFI FORM
002515	QUALIFICATIONS OF BIDDERS
004105	BIDDER'S DECLARATION
004116	PROPOSAL (PB-G)
004116	PROPOSAL (PB-M)
004116	PROPOSAL (PB-E)
004357	INSURANCE CERTIFICATION
004519	NON-COLLUSIVE FORM
004521	HOLD HARMLESS AGREEMENT
004547	IRAN DIVESTMENT ACT CERTIFICATION
004548	SEXUAL HARASSMENT CERTIFICATION
004549	LABOR LAW 220-I CERTIFICATION FORM
004550	SUBCONTRACTORS LIST
005209	AGREEMENT & (EXHIBIT A & B)
007021	NYSED 155.5 REGULATIONS
007200	GENERAL CONDITIONS
007343.1	WEEKLY PAYROLL FORM
007343	PREVAILING WAGE RATES

SAMPLE AIA DOCUMENTS

AIA A310	(BID BOND)
AIA A312	(PERFORMANCE BOND)
AIA A312	(PAYMENT BOND)
AIA G702	(APPLICATION AND CERTIFICATE FOR PAYMENT)
AIA G703	(CONTINUATION SHEET)
AIA G704	(CERTIFICATE OF SUBSTANTIAL COMPLETION)
AIA G706	(CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS.)
AIA G706A	(CONTRACTORS AFFIDAVIT OF RELEASE OF LIENS)
AIA G707	(CONSENT OF SURETY TO FINAL PAYMENT)

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011400.11	SED UNIFORM SAFETY STANDARDS
011400	WORK RESTRICTIONS
011419	SITE UTILIZATION PLAN
012100	ALLOWANCES
012300	ALTERNATES
012500	PRODUCT SUBSTITUTION PROCEDURES
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013100	PROJECT MANAGEMENT AND COORDINATION
013119	PROGRESS MEETINGS
013216	CONSTRUCTION SCHEDULE
013300	SUBMITTALS
014100	REGULATORY REQUIREMENTS
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014500.01	STATEMENT OF SPECIAL INSPECTIONS AND TESTS
014536	ENVIRONMENTAL QUALITY CONTROL
015000	TEMPORARY FACILITIES AND CONTROLS
016100	BASIC PRODUCT REQUIREMENTS
016500	PRODUCT DELIVERY, STORAGE AND HANDLING
017329	CUTTING AND PATCHING
017423	CLEANING
017500	STARTING AND ADJUSTING
017800	CLOSEOUT SUBMITTALS
017823	OPERATING AND MAINTENANCE DATA
017839	PROJECT RECORD DOCUMENTS
017843	SPARE PARTS
017900	DEMONSTRATION AND TRAINING

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022600	HAZARDOUS MATERIALS ASSESSMENT
024119	SELECTIVE DEMOLITION
028200	ASBESTOS REMEDIATION
028600	DISPOSAL OF HAZARDOUS WASTE

DIVISION 03 – CONCRETE

030000	CONCRETE

DIVISION 04 – MASONRY

040120	MAINTENANCE OF UNIT MASONRY
042113	BRICK MASONRY
042200	CONCRETE UNIT MASONRY

DIVISION 05 - METALS

053100	STEEL DECKING
054000	COLD-FORMED METAL FRAMING
055000	METAL FABRICATIONS
055213	PIPE AND TUBE RAILINGS

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

061000	ROUGH CARPENTRY

062000 FINISH CARPENTRY

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

072100 THERMAL INSULATION
072800 FLUID-APPLIED MEMBRANE AIR AND WATER BARRIERS
075323 ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING (EPDM)
078413 PENETRATION FIRESTOPPING
079200 JOINT SEALANTS

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081213 HOLLOW METAL FRAMES
081214 TRIMLESS DOOR FRAME SYSTEM
081416 FLUSH WOOD DOORS
081613 FIBERGLASS DOORS & FRAMES
084113 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
085659 ALUMINUM SLIDING SERVICE WINDOW
087100 DOOR HARDWARE
088000 GLAZING

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095100.11 ACOUSTICAL WOOD PANEL CEILINGS
095113 ACOUSTICAL PANEL CEILINGS
095113.13 PERIMETER TRANSITION SYSTEM
096513 RESILIENT BASE AND ACCESSORIES
096519 RESILIENT TILE FLOORING
096716 EPOXY FLUID-APPLIED FLOORING
096813 TILE CARPETING
097813 METAL INTERIOR ACOUSTICAL WALL PANELS (METALWORKS)
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099123 INTERIOR PAINTING

DIVISION 10 – SPECIALTIES

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DIVISION 12 – FURNISHINGS

124813.13 SURFACE MOUNTED ENTRANCE FLOOR MATS AND FRAMES

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DIVISION 23 – HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

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230015 MECHANICAL DEMOLITION
230512 MOTOR REQUIREMENTS FOR HVAC SYSTEMS
230529 PIPE HANGERS AND SUPPORTS
230555 MECHANICAL SYSTEM IDENTIFICATION
230594 BALANCING OF AIR AND HYDRONIC SYSTEMS
230700 PIPE INSULATION
230702 FIRESTOPPING FOR HVAC

230703	ROOF ACCESSORIES FOR HVAC
230719	DUCTWORK INSULATION
230923	AUTOMATIC TEMPERATURE CONTROLS AND BUILDING AUTOMATION SYSTEM
230991	INSTRUMENTATION AND CONTROL INTEGRATION
230993	SEQUENCE OF OPERATIONS
232000	PIPES, VALVES AND FITTINGS
232001	CONDENSATE DRAIN PIPING
232003	THERMOMETERS AND PRESSURE GAUGES
232007	PIPING SPECIALTIES
232300	REFRIGERANT PIPING
233113	SHEET METAL WORK
233416	EXHAUST FANS
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260010	ELECTRICAL DEMOLITION
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265000	LIGHTING

DIVISION 27 – COMMUNICATIONS

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DIVISION 28 – FIRE ALARM

283100	FIRE DETECTION AND ALARM

APPENDIX 01

A) ENVIRONMENTAL SURVEY FOR PORT CHESTER MIDDLE SCHOOL
B) AHERA REPORT PORT CHESTER MIDDLE SCHOOL

EXHIBIT 'B' – LIST OF DRAWINGS

See Attached G0.0 Cover Sheets

PORT CHESTER RYE UNION FREE SCHOOL DISTRICT

AUDITORIUM UPGRADES AT PORT CHESTER MIDDLE SCHOOL

113 Bowman Ave.
Port Chester, NY 10573

SED PROJECT CONTROL NUMBER: SED #: 66-19-04-03-0-013-030

CONTRACT G - GENERAL CONSTRUCTION WORK, CONTRACT M - HEATING, VENTILATION, AND AIR CONDITIONING WORK, & CONTRACT E - ELECTRICAL WORK

DRAWING LIST

INFORMATIONAL DRAWINGS

G 000.00	COVER SHEET
G 100.00	EXISTING GROUND FLOOR LIFE SAFETY PLAN (FOR INFORMATION ONLY)
G 101.00	EXISTING FIRST FLOOR LIFE SAFETY PLAN (FOR INFORMATION ONLY)
G 102.00	EXISTING SECOND FLOOR LIFE SAFETY PLAN (FOR INFORMATION ONLY)
G 012.00	CODE COMPLIANCE ANALYSIS

STRUCTURAL DRAWINGS

S 000.00	GENERAL NOTES
S 120.00	PROJECTOR ROOM FLOOR FRAMING PLAN
S 140.00	ROOF FRAMING PLAN
S 500.00	STRUCTURAL DETAILS

ARCHITECTURAL DRAWINGS

AD 110.00	AUDITORIUM DEMOLITION FLOOR PLAN
AD 120.00	AUDITORIUM DEMOLITION REFLECTED CEILING PLAN
AD 130.00	ROOF DEMOLITION PLAN
A 010.00	PARTITION TYPES
A 100.00	AUDITORIUM PLAN
A 101.00	ENLARGED PLANS
A 110.00	AUDITORIUM FINISH FLOOR PLAN
A 120.00	AUDITORIUM REFLECTED CEILING PLAN
A 130.00	ROOF PLAN
A 200.00	AUDITORIUM ELEVATIONS
A 201.00	AUDITORIUM ELEVATIONS
A 400.00	BUILDING SECTIONS
A 500.00	PLAN DETAILS
A 501.00	DETAILS
A 502.00	DOOR AND WINDOW TYPES AND DETAILS
A 600.00	SCHEDULES AND DETAILS

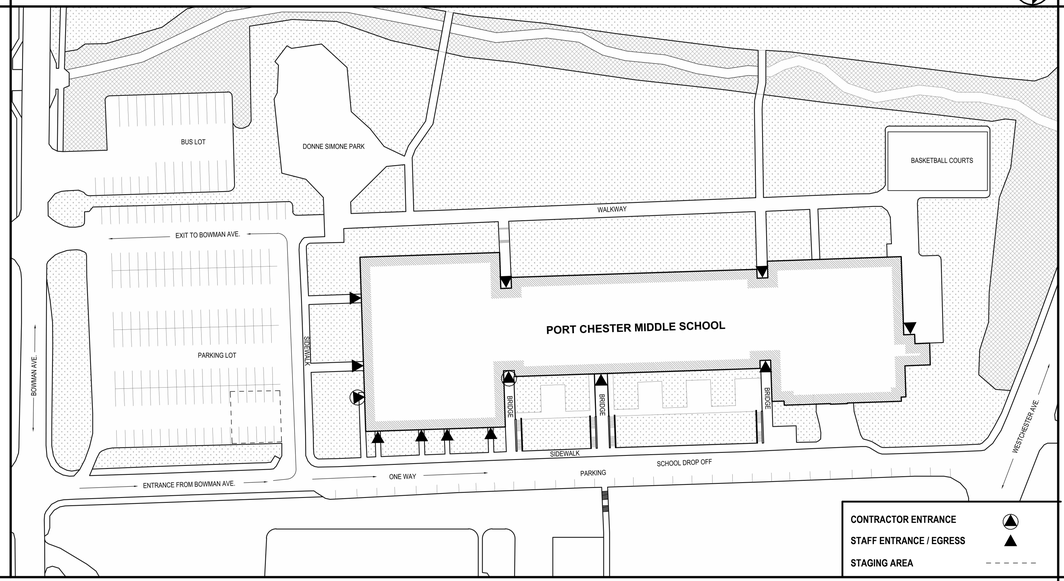
HVAC DRAWINGS

M 001.00	LEGEND, SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES
M 002.00	GENERAL DEMOLITION NOTES
MD 110.00	FIRST FLOOR DEMOLITION PLAN
MD 120.00	ROOF DEMOLITION PLAN
M 100.00	PARTIAL GROUND FLOOR PLANS
M 110.00	FIRST FLOOR NEW WORK PLAN
M 120.00	ROOF NEW WORK PLAN
M 500.00	DETAILS
M 501.00	DETAILS
M 600.00	SCHEDULES
M 700.00	CONTROLS

ELECTRICAL DRAWINGS

E 001.00	ELECTRICAL LEGENDS
ED 141.00	ELECTRICAL PARTIAL FIRST FLOOR DEMOLITION PLAN
ED 142.00	ELECTRICAL PARTIAL ROOF DEMOLITION PLAN
E 100.00	ELECTRICAL PARTIAL BASEMENT POWER PLAN
E 101.00	ELECTRICAL PARTIAL FIRST FLOOR POWER PLAN
E 102.00	ELECTRICAL PARTIAL ROOF PLAN
E 120.00	ELECTRICAL PARTIAL FIRST FLOOR LIGHTING PLAN
E 400.00	ELECTRICAL ENLARGED PLANS
E 500.00	AUDIO/VISUAL & THEATRICAL LIGHTING LAYOUT PLAN
E 501.00	AUDIO/VISUAL SYSTEM FUNCTIONAL DETAIL
E 502.00	AUDIO/VISUAL COVER PLATE DETAILS
E 503.00	AUDIO/VISUAL SPEAKER MOUNTING DETAILS
E 504.00	AUDIO/VISUAL TERMINAL FRAME LAYOUT DETAILS
E 505.00	AUDIO/VISUAL SPEAKER MOUNTING SAFETY DETAIL
E 506.00	THEATRICAL LIGHTING FIXTURE ADDRESS SCHEDULES
E 507.00	THEATRICAL LIGHTING PANEL SCHEDULE
E 508.00	THEATRICAL LIGHTING SINGLE LINE DIAGRAM
E 509.00	AUDITORIUM AISLE LIGHTING PLAN
E 600.00	ELECTRICAL SCHEDULES
FA 001.00	FIRE ALARM LEGENDS AND RISER DIAGRAMS
FA 100.00	FIRE ALARM FLOOR PLAN
FA 102.00	FIRE ALARM ROOF PLAN

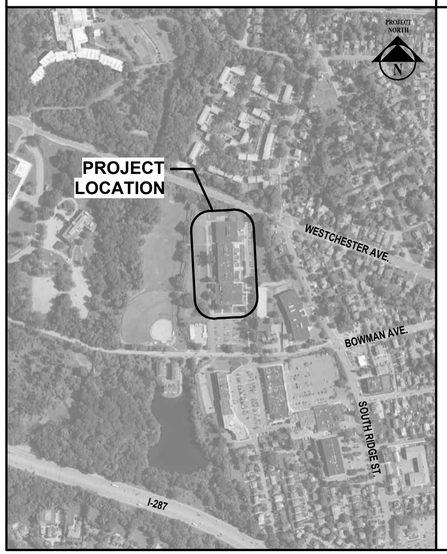
STAGING PLAN



ABBREVIATIONS

AB	Anchor Bolt	EXT	Exterior	STL	Steel
A/C	Air Conditioning	F.C.	Fire Code	ST	Storage
ACT	Acoustical Ceiling Tile	F.E.	Fire Extinguisher	TER	Terrazzo
ACU	Air Conditioning Unit	F.R.	Fire Rated	THK	Thick
A/E	Architect/Engineer	FIN	Finish	T.O.	Top Of
A.F.F.	Above Finish Floor	FL	Floor	TR	Tread
ALUM	Aluminum	FD	Floor Drain	TYP	Typical
ALT	Alternate	FTG	Footing	UR	Urinal
ANSI	American National Standards Institute	GAL	Galvanized	UTIL	Utility
		GA	Gauge	VB	Vapor Barrier
APPROX	Approximately	GL	Glass	VCT	Vinyl Composition Tile
ASTM	American Society for Testing & Materials	GR	Grade	V	Vent
		GWB	Gypsum Wall Board	W/	With
BD	Board	GYP	Gypsum	WC	Water Closet
BLDG	Building	HC	Handicapped	WWF	Welded Wire Fabric
BM	Beam	HM	Hollow Metal	WD	WOOD
B.O.	Bottom Of	INSUL	Insulation/Insulating		
CLG	Ceiling	INT	Interior		
CT	Ceramic Tile	LAV	Lavatory		
CL	Closet	LDR	Leader		
CLR	Clear	MAX	Maximum		
CMU	Concrete Masonry Unit	MECH	Mechanical		
COL	Column	MTL	Metal		
CONC	Concrete	MIN	Minimum		
CONST	Construction	MISC	Miscellaneous		
CONT	Continuous	MO	Masonry Opening		
C.J.	Control Joint	MR	Moisture Resistant		
CORR	Corridor	N.I.C.	Not in Contract		
CPT	Carpet	N.T.S.	Not to Scale		
DIA	Diameter	O.C.	On Center		
DIM	Dimension	O.D.	Outide Diameter		
DN	Down	O.H.	Overhead Door		
DS	Down Spout	PLYWD	Plywood		
EA	Each	PT	Paint		
EL	Elevation	P.LAM	Plastic Laminate		
ELEC	Electric/Electrical	PVC	Polyvinyl Chloride		
ELEV	Elevator	R	Radius or Riser		
EP	Electrical Panel	RCP	Reflected Ceiling Plan		
EPDM	Ethylene Propylene Diene Monomer	RD	Roof Drain		
		REINF	Reinforced		
EPY	Epoxy Coating	RM	Room		
EQ	Equal	RO	Rough Opening		
EQUIP	Equipment	SIM	Similar		
EX	Existing	SPEC	Specifications		
EXP	Exposed	S.F.	Square Foot		
E.J.	Expansion Joint	S.S.	Stainless Steel		

LOCATION MAP



GENERAL NOTES

1. ALL WORK SHALL COMPLY WITH THE NEW YORK STATE FIRE PREVENTION AND BUILDING CODE AS WELL AS THE NEW YORK STATE EDUCATION DEPARTMENT MANUAL OF PLANNING STANDARDS AND ALL OTHER APPLICABLE CODES, LAWS STATUTES.
2. THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF ANSI AND WHERE APPLICABLE PROVIDE ADA COMPLIANT BUILDING COMPONENTS.
3. STRICTLY ADHERE TO MANUFACTURER'S PRINTED INSTRUCTIONS.
4. THE DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY. THE PROJECT MANUAL, SEPARATELY BOUND, CONTAINS THE CONDITIONS OF THE CONTRACT, PROCEDURES AND TECHNICAL SPECIFICATIONS.
5. ALL NOTES APPEARING HEREIN, WITH THOSE ON VARIOUS DRAWINGS SHALL APPLY TO ALL DRAWINGS AND FORM PART OF THE CONTRACT DOCUMENTS.
6. IT IS THE CONTRACTORS RESPONSIBILITY TO FIELD VERIFY ALL DIMENSIONS, SQUARE FOOTAGES, LOCATIONS AND QUANTITIES OF ALL ITEMS AND/OR SPACES WHETHER INDICATED IN THE DRAWINGS OR NOT.
7. DO NOT SCALE MEASURE ANY DRAWING. VERIFY THE FIGURES, DIMENSIONS AND DESIGN INTENTION SHOWN ON THE DRAWINGS BEFORE BEGINNING LAYOUT OF THE WORK AND REPORT ANY ERRORS, INACCURACIES, OR CONFLICTS TO THE ARCHITECT/ENGINEER IN WRITING BEFORE BEGINNING ANY WORK. DIMENSIONS NOTED AS "EQUAL" OR "EQ" REFER TO A DISTANCE RELATIONSHIP CONTAINED ONLY IN THAT ROOM AT AN OPPOSING OR PARALLEL WALL UNLESS NOTED OTHERWISE.
8. VERIFY EXACT LAYOUT COMPATIBILITY WITH ALL EXISTING CONDITIONS BEFORE BEGINNING WORK.
9. THE SITE WILL BE OCCUPIED DURING THE ON-SITE WORK PERFORMANCE PERIOD.
10. DISTURB ONLY THOSE AREAS OF THE SITE AFFECTED BY RENOVATION, UNLESS NOTED OTHERWISE. PROTECT ALL OTHER AREAS. CONTRACTORS SHALL BE RESPONSIBLE FOR ALL PATCH AND REPAIR OF EXISTING FINISHES WHICH ARE DAMAGED DURING CONSTRUCTION.
11. THE OWNER RESERVES THE RIGHT AT ALL TIMES TO DELIVER, PLACE AND INSTALL EQUIPMENT AND FURNISHINGS AS THE WORK PROGRESSES SO LONG AS THERE IS NOT A CONFLICT WITH THE CONTRACTORS.
12. THE CONTRACTOR SHALL MAINTAIN AT THE SITE ONE RECORD COPY OF ALL DRAWINGS, SPECIFICATIONS AND APPROVED SHOP DRAWINGS AND APPROVED SAMPLES MODIFIED AS REQUIRED TO RECORD ALL CURRENT CHANGES DURING CONSTRUCTION.
13. ANY CHANGES TO THE SCOPE OF WORK OR IN THE CONSTRUCTION DETAILS, WHETHER DUE TO FIELD CONDITIONS OR OMISSION, SHALL BE DOCUMENTED FOR ARCHETCURAL/ENGINEERING REVIEW PRIOR TO EXECUTION. ANY INCREASE OR DECREASE IN THE CONTRACT PRICE MUST BE APPROVED IN WRITING PRIOR TO EXECUTION.
14. AT THE END OF EACH WORK DAY, THE CONTRACTOR MUST REMOVE ALL DEBRIS FROM THE WORK AREA AND PLACE IN THE DUMPSTER PROVIDED BY THE CONTRACTOR.
15. PERFORM ALL WORK AND COORDINATE ALL ASPECTS OF CONSTRUCTION TO KEEP THE CONSTRUCTION DURATION AND DISTURBANCE OF THE FACILITY TO A MINIMUM.
16. THE CONTRACTOR IS TO DOCUMENT, THROUGH DIGITAL PHOTOGRAPHS, THE CONDITION OF THE SITE, BUILDING AND SURROUNDING CONDITIONS PRIOR TO DEMOLITION. THE CONTRACTOR IS TO NOTIFY THE ARCHITECT OF ANY DAMAGED AREAS PRIOR TO MOBILIZATION. IF AT THE END OF THE PROJECT THERE ARE DAMAGES TO THE SITE, BUILDING, OR SURROUNDING CONDITIONS, THE CONTRACTOR IS RESPONSIBLE TO RESTORE ANY AREAS DISTURBED TO EXISTING CONDITIONS PRIOR TO CONSTRUCTION.
17. THE CONTRACTOR SHALL BE RESPONSIBLE TO MAINTAIN WATER-TIGHT WEATHER PROTECTION THROUGHOUT ALL WORK AREAS AND EXISTING AREAS IMMEDIATELY ADJACENT TO THOSE WORK AREAS FOR THE ENTIRE DURATION OF THE PROJECT.
18. THE CONTRACTOR, BY SUBMITTING A BID FOR THE WORK, REPRESENTS THAT THEY HAVE INSPECTED THE SITE AND ARE FULLY FAMILIAR WITH THE WORK AND ALL FIELD CONDITIONS RELATED TO AND AFFECTING THE WORK AND ITS PERFORMANCE. ANY EXCEPTIONS, DISCREPANCIES, OR CONFLICTS BETWEEN FIELD CONDITIONS AND THE CONTRACT DOCUMENTS THAT MAY AFFECT THE WORK OR ITS PERFORMANCE SHALL BE SUBMITTED IN WRITING TO THE ARCHITECT PRIOR TO THE CONTRACTOR'S SUBMISSION OF ITS BID. FAILURE TO PROVIDE SUCH NOTICE SHALL NOT SERVE AS A BASIS FOR ANY ADJUSTMENT TO THE CONTRACT SUM OR CONTRACT TIME. IT SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO PROVIDE ALL NECESSARY ACCOMMODATIONS TO COMPLETE TO WORK AS REQUIRED BY THE CONTRACT DOCUMENTS.

SYMBOLS LEGEND

OFFICE 10001A	Room Designation	1 Title SCALE: 1/8" = 1'-0"	Drawing Title
1 / A 101	Exterior Elevation	A / A 101 / A	Interior Elevation
1 / A 101	Section Cut	Ref 1 / FAD 100	Detail Key
0	Column Grid	XX	RevisionTag
1i	Wall Type	12'-0"	Primary Ceiling Tag
A	Window Elevation Key	1'-0" A.F.F.	Secondary Ceiling Tag
1001A / 1001A	Door Number		Rigid Insulation
	Batt Insulation		Gypsum Board
	Brick		Plywood
	Acoustic Tile Ceramic Tile		Wood Blocking
	Concrete		Wood
	Concrete Block		Steel

H 2 M architects + engineers

1133 Westchester Avenue, Suite N-210
White Plains, NY 10605
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NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No.: 0018178

CONSULTANTS:

MARK	DATE	DESCRIPTION
	2/27/2026	SED SUBMISSION
	5/6/2026	BID SUBMISSION

KEVIN M. MEDLER, R.A. Exp: Date

"IN ACCORDANCE WITH ARTICLE 145, SECTION 7209 OF THE NYS EDUCATION LAW, ALTERATION OF THIS DOCUMENT EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL"

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
B.PADDACK	L.SAMUELS	B.PADDACK	K.MEDLER

PROJECT No:	DATE:	SCALE:
PRSD 2414	MAY 2026	AS SHOWN

CLIENT

PORT CHESTER RYE UNION FREE SCHOOL DISTRICT

AUDITORIUM UPGRADES AT PORT CHESTER MIDDLE SCHOOL

113 Bowman Ave.
Port Chester, NY 10573

SED #: 66-19-04-03-0-013-030

CONTRACT: ALL CONTRACTS

STATUS: FINAL BID SET

SHEET TITLE: COVER SHEET

DRAWING No.: G 000.00

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NYSED 155.5 REGULATIONS

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 requirements of 8 NYCRR 155.5, Uniform Safety Standards for School Construction and Maintenance Projects, that are required in construction documents. The Contractor shall comply with these requirements in addition to any and all similar requirements in the Contract Documents.

1.3 REQUIREMENTS

A. The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy. In addition, the following shall be strictly enforced and cooperated with:

1. No smoking or vaping of nicotine, THC or cannabis 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 do not block exits or emergency egress windows.
3. Proper operation of fire extinguishers, fire alarm, and smoke/fire detection systems shall be maintained throughout the project.

B. Verify that all school areas to be disturbed during renovation or demolition have been or will be tested for lead and for asbestos. For any project work that disturbs surfaces that contain lead or asbestos, follow the plans and specifications prepared by a certified Lead Risk Assessor or Supervisor which details provisions for occupant protection, worksite preparation, work methods, cleaning, and clearance testing; which are in general accordance with HUD Guidelines.

1. All asbestos abatement projects shall comply will all applicable federal and State laws including but not limited to the New York

State Department of Labor industrial code rule 56(12NYCRR56), and the federal Asbestos Hazard Emergency Response Act (AHERA), 40 CFR Part 763 (Code of Federal Regulations, 1998 Edition); available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234.

2. 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 (HUD), Washington, D.C. 20410; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234.

C. 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 warnings 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.

D. 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 may be assigned for construction worker use during the work hours. In general,

workers may not use the 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 buildings 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.

E. The Architect will prepare phasing plans indicating exits, required by the applicable building code, which shall be maintained during construction.

1. The Contractor shall submit plans, to be approved by the Architect, indicating temporary construction required to isolate construction equipment, materials, people, dust, fumes, odors, and noise during the construction period and meeting the requirements of the phasing plans.
2. Temporary construction details shall meet code-required fire ratings for separation and corridor enclosure.
3. At a minimum, required exits, temporary stairs, ramps, exit signs, and door hardware shall be provided at all times.

F. Prepare a plan detailing how adequate ventilation will be maintained during construction.

1. 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.
2. The plan shall also indicate how required ventilation to occupied spaces affected by construction will be maintained during the project.

G. 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.

H. The 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.

I. The 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 manufacturers recommendations before a space can be occupied.

J. Large and small asbestos abatement projects as defined by 12NYCRR56 shall not be performed while the building is occupied. The term "building", as used in this paragraph, means a wing or major section of a building that can be completely isolated from the rest of the building with sealed non-combustible construction. The isolated portion of the building must contain exits that do not pass through the occupied portion, and ventilation systems must be physically separated and sealed at the isolation barrier.

K. Exterior work such as roofing, flashing, siding, or soffit work may be performed on occupied buildings provided proper variances are in place as required, and complete isolation of ventilation systems and at windows is provided. Care must be taken to schedule work so that classes are not disrupted by noise or visual distraction.

GENERAL CONDITIONS

of the

CONTRACT for CONSTRUCTION

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GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

The within document includes detailed provisions concerning the capital improvement work to be performed by the Contractors engaged by the School District. This document contains provisions which relate particularly to capital improvement projects in the school district setting in New York State. This document is incorporated by reference into all contracts to be awarded by the School District and should be reviewed carefully by the Contractor to whom the award of a contract is made. Consultation with an attorney and insurance representative is advised.

In this document, any gender shall include the other gender, the singular shall include the plural, and the plural shall include the singular. Each defined term may be used in its singular or plural form whether or not so defined.

ARTICLE 1
DEFINITIONS

A. "Addendum" or "Addenda" refers to revised drawings and/or written requirements for the capital improvement work issued by the Architect prior to the time indicated for submission of a bid by a contractor.

B. The "Architect" is the design professional engaged by the School District to perform design related functions respecting the capital improvement projects to be performed in the School District that is identified on the first page of the agreement between the Owner and the Contractor.

C. "Board of Education" refers to the Board of Education of the School District.

D. "Central Administration" refers to the School District's Superintendent of Schools, Deputy Superintendent, Assistant Superintendents, and Director of Facilities.

E. The "Construction Manager" is the entity engaged by the School District to act as its representative during the course of construction of the Project that is identified on the first page of the agreement between the Owner and the Contractor.

F. The "Contractor" refers to each entity engaged by the School District to perform all or a part of the capital improvement project on its behalf.

G. The "Contract Documents" are the agreement between the Owner and the Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, sketches, specifications, Addenda, other documents listed in Article 9 of the agreement between the Owner and the Contractor, modifications issued after execution of the agreement between the Owner and Contractor, and all other written or drawn descriptions of the products, labor and materials to be provided for the Project.

H. The "Drawings" are the plans, elevations, sections, details, schedules and diagrams developed by the Architect for the capital improvement projects to be performed in accordance with the Project Manual of which these General Conditions of the Contract for Construction form a part.

I. A "Modification" is (1) a written amendment to the agreement between the Owner and Contractor, (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 (e.g., Field Order).

J. The "Project" refers to the entire capital improvement project to be performed in accordance with the Project Manual and may include work by the Owner.

K. The "Project Manual" is the bound document which is issued simultaneously with the Drawings and includes the Notice to Bidders, Instruction for Bidders, Bid Proposal Form, link to the Prevailing Wage Rate schedule and the written requirements for labor, materials, equipment, construction systems and the like necessary for the Contractor to complete the capital improvement work for which it has been engaged.

L. The "Owner" refers to the School District, the Board of Education, its officers, agents and employees.

M. The term "Specialist" or "Specialty Contractor" as used in the Contract Documents shall mean an individual or firm of established reputation, or, if newly organized, whose personnel have previously established a reputation in the same field, which is regularly engaged in, and which maintains a regular force of workers skilled in either manufacturing or fabricating items required by the Contract, installing items required by the Contract, or otherwise performing work required by the Contract.

N. 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.

O. A "Subcontractor" is a person or entity who has a direct contract with a Contractor to provide material and/or labor for the Project on or off the site, or to otherwise furnish labor, material or other services with respect to a portion of the Contractor's work. A "Sub-subcontractor" is a person or entity who has a direct or indirect contract with a Subcontractor engaged by a Contractor to perform a portion of the Subcontractor's work at the site, or to otherwise furnish labor, material or other services with respect to a portion of the Subcontractor's work.

P. "Accepted", "directed" "permitted," "requested," "required," and "selected" mean, unless otherwise explained, "accepted by the Architect and/or Owner" "directed by the Architect and/or Owner," "permitted by the Architect and/or Owner," "requested by the Architect and/or Owner," "required by the Architect and/or Owner," and "selected by the Architect and/or

Owner." However, no such implied meaning will be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.

Q. "As accepted" "or acceptable substitute", and "for review" mean the Architect is the sole judge of the quality and suitability of the proposed substitutions. Where used in conjunction with the Architect's response to submittals, requests, applications, inquiries, reports, and claims by the Contractor, the meaning will be held to the limitations of the Architect's responsibilities and duties as stated in these General Conditions. In no case will "accepted by the Architect" be interpreted as an assurance to the Contractor that the requirements of the Contract Documents have been fulfilled.

R. "Furnish" means supply (by purchase, fabrication or construction) and deliver to the Project site or other designated location, ready for unloading, unpacking, storing, assembly, installation, application, erection, or other form of incorporation into the Project, and maintained ready for use. Supply and deliver products requiring additional or supplemental fitting, assembly, fabrication, or incorporation into other elements of the Project directly to the fabricator, installer or manufacturer as required.

S. "Install" means unload, unpack, use, fit, attach, assemble, apply, place, connect, anchor, erect, finish, cure, protect, clean, and similar operations required to properly incorporate work into the Project.

T. "Provide" means furnish and install.

U. "Replace" means remove designated, damaged, rejected, defective, unacceptable, or non-conforming work from the Project and provide new work meeting the requirements of the Contract Documents in place thereof.

V. The word "include", in any form other than "inclusive", is non-limiting and is not intended to mean all-inclusive.

ARTICLE 2
CONTRACTOR'S REPRESENTATIONS

A. Upon submission of its bid to the Owner, the Contractor expressly represents:

1. The Contractor represents and warrants that it performed a detailed investigation of the site(s) and that such investigation was sufficient to disclose the conditions of the site(s) at which work is to be performed by it and all improvements thereon, and the conditions under which the work is to be performed, including, but not limited to (a) the location, condition, layout and nature of the Project site(s) and surrounding areas; (b) the cost and availability of labor, materials and equipment necessary to perform the work; (c) the areas of the work which will cause a disruption to the necessary and proper operation of the facilities by the Owner; (d) generally prevailing climatic conditions; and (e) other pertinent limitations on the performance of its work.

2. The Contractor represents and warrants that it has carefully studied and compared the Drawings and pertinent provisions of the Project Manual and that any errors, omissions, ambiguities, discrepancies or conflicts found in said documents have been brought to the attention of the Architect for clarification prior to the Contractor's submission of its bid. If, in the interpretation of Contract Documents, requirements within the Drawings and Specifications conflict, or it appears that the Drawings and Specifications are not in agreement, the requirement to be followed shall be decided by the Architect. Where there is a discrepancy in quantity, the Contractor shall provide the greater quantity; where there is a discrepancy in quality, the Contractor shall provide the superior quality. Addenda supersede the provisions that they amend. In case of errors, omissions, ambiguities, discrepancies or conflicts in the Contract Documents that the Contractor failed to call to the Architect's attention before submitting its bid, the Contractor shall secure instructions from the Architect through the Construction Manager before proceeding with the work affected by such errors, omissions, ambiguities, discrepancies or conflicts and the Contractor agrees to abide by the Architect's instructions and to carry out the work in accordance with the instructions and interpretation of the Architect. The Contractor shall assume full responsibility and cost for proceeding with the affected work without the instructions and/or interpretation of the Architect.

3. Each Contractor certifies that it is experienced and familiar with the requirements and conditions imposed during the construction of similar work in the area. This includes, but is not limited to, "out of sequence" or "come back" work for the removal of plant, equipment, temporary wiring or plumbing, etc. This "out of sequence" work may also include phasing of construction activities to accommodate the installation of the work at various locations in an orderly fashion and the completion of work at various locations and/or levels at various times. This "phasing", "out of sequence", or "come back" work shall be done at no cost to other contractors, the Owner, Architect or the Construction Manager.

B. The Contractor warrants to the Owner that (1) the materials and equipment furnished under its contract will be of good quality and new, and of recent manufacture, unless otherwise required or permitted by the Contract Documents, (2) that its work will be free from defects not

inherent in the quality required or permitted, and (3) that its work will conform with the terms and conditions of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, shall be considered defective and shall be removed and replaced at the Contractor's cost and expense. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

C. Except as to any reported errors, inconsistencies or omissions, and to concealed or unknown conditions, by executing the contract awarded by the Owner, the Contractor represents the following:

1. The Drawings and Specifications found in the Project Manual are sufficiently complete and detailed for the Contractor to (a) perform the work required to produce the results intended by the Owner and (b) comply with all the requirements of its contract with the Owner.

2. The work required to be performed by the Contractor including, without limitation, all construction details, construction means, methods, procedures and techniques necessary to perform its work, use of materials, selection of equipment and requirements of product manufacturers are consistent with: (a) good, prevailing and accepted industry standards applicable to its work; (b) requirements of any warranties applicable to its work; and (c) all laws, ordinances, regulations, rules and orders which bear upon the Contractor's performance of its work.

3. The Drawings, Specifications and other Contract Documents have been prepared with care and are intended to show and describe as clearly as is practicable the work required to be done. Work under all items in the Contract must be carried out to meet field conditions to the satisfaction of the Architect and Owner and in accordance with the Contract Documents, including but not limited to the Drawings and Specifications.

4. All dimensions shown on the Drawings are for bidding purposes only. It is the responsibility of the Contractor to verify all dimensions in the field to insure proper and accurate fit of materials and items to be installed.

5. The Contractor shall provide all labor, materials, equipment, appliances and services necessary to execute and complete all work as required by the Contract Documents and the applicable Building Codes. Whenever any additional materials and/or workmanship not shown or specified are required to complete the work of the Contract Documents in accordance with the obvious intent thereof, the Contractor shall provide such materials and workmanship at no additional cost to the Owner. It is intended that all mechanical and electrical systems will be complete and in proper operation and that all construction components will be complete and in compliance with accepted construction practice upon completion of the work. Even if items are missing from the Drawings and/or Specifications but are normally required for proper operation of mechanical and electrical systems, or to complete otherwise incomplete construction or to meet governing code requirements, they shall be included by the Contractor,

unless the Contractor sought and received contradictory interpretation or clarification from the Architect.

D. The representations set forth herein shall survive expiration and/or termination of the Contractor's agreement with the Owner.

ARTICLE 3
CONTRACTOR'S CONSTRUCTION PROCEDURES

A. 1. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures required for the proper execution of its work on the Project. Where the Drawings and/or Project Manual make reference to particular construction means, methods, techniques, sequences or procedures or indicate or imply that such are to be used in connection with the Contractor's work, such reference is intended only to indicate that the Contractor's work is to produce at least the quality of the work implied by the operations described, but the actual determination as to whether or not the described operations may be safely or suitably employed in the performance of the Contractor's work shall be the sole responsibility of the Contractor. All loss, damage, liability, or cost of correcting defective work arising from the employment of a specific construction means, method, technique, sequence or procedure shall be borne solely by the Contractor.

2. Neither the Architect, the Construction Manager or the Owner will have control over or charge of and will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the work, since these are solely the Contractor's responsibility as provided herein.

3. The Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, rigging, water, heat, utilities, light, transportation, and other facilities and services necessary for proper execution and completion of its work, whether temporary or permanent and whether or not incorporated or to be incorporated in its work.

B. The Contractor shall be responsible for coordinating the work of its own forces and the work of Subcontractors engaged by it to perform the work of the Project on its behalf. The Contractor shall supply to its own work forces, and Subcontractors engaged by it to perform portions of its work, copies of the Drawings and Project Manuals for the work to be performed by such individuals/entities on its behalf. The Contractor shall review any specified or installation procedure with its employees and/or Subcontractors, including those recommended by any product manufacturer, prior to the commencement of the relevant portion of the work to be performed. The Contractor shall be responsible to the Owner for the acts and/or omissions of the Contractor's employees, the Contractor's Subcontractors, the Contractor's material suppliers, and/or their respective agents and employees, and any other persons performing portions of the work or supplying materials or equipment on behalf of the Contractor.

C. The Contractor shall be responsible for the inspection of portions of the Project performed by its own work force and/or subcontractors engaged by it for the purpose of determining that said work is in proper condition to receive subsequent work.

D. The Contractor shall perform its work in accordance with the standards of the construction industry applicable to work in the locale in which the work is to be performed.

E. The Contractor shall only employ labor on the Project or in connection with its work capable of working harmoniously with 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 site(s) 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.

F. 1. 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, the Construction Manager 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.

2. In case the progress of the capital improvement work to be performed by the Contractor is effected by any undue delay in furnishing or installing any items or materials or equipment required pursuant to its agreement with the Owner because of a conflict involving any such labor agreement or regulation, the Owner may require that other material or equipment of equal kind and quality be provided pursuant to a Change Order or Construction Change Directive but in no case shall the amount of such change be charged by the Contractor to the Owner as an additional cost to perform the capital improvement work pursuant to its contract.

3. The Contractor shall ensure that its work continues uninterrupted during the pendency of a labor dispute.

4. The Contractor shall be liable to the Owner for all damages suffered by the Owner occurring as a result of work stoppages, slowdowns, disputes or strikes.

G. The Contractor shall enforce strict discipline and good order among the Contractor's employees and its Subcontractors' work forces and other persons carrying out the performance of its work at the Project site(s). The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them. The Owner reserves the right to object to any person to be hired or who is employed by the Contractor. Upon the request of the Owner, said

person shall be removed from the Project and not again be assigned to perform the Contractor's work without the written permission of the Owner.

H. Within one (1) week after a Notice to Proceed is received, the Contractor shall employ a competent, full-time Project Manager and On Site Superintendent to be approved by the Owner or its representative, and such necessary assistants who shall be in attendance at each Project site whenever and wherever work is in progress to provide for the expeditious completion of the work. Said Project Manager and On Site Superintendent shall be employed until punchlist and closeout of the Project. To the extent work is being performed contemporaneously at different facilities within the School District, the Contractor shall assign different superintendents for each facility at which work is being performed. The Project Manager and On Site Superintendent assigned by the Contractor shall not be changed except with the consent of Owner, unless the Project Manager or On Site superintendent or such assistant proves to be unsatisfactory to the Contractor and/or ceases to be in its employ. The Project Manager and On Site Superintendent shall represent the Contractor, and communications given to the Project Manager or On Site Superintendent, whether verbal or written, shall be as binding as if given to the Contractor. Oral communications to the superintendent(s) or their assistant(s) and/or project manager shall be confirmed in writing by the Construction Manager, Owner or Architect. The Contractor shall forward to the Owner a copy of the resumes for each of its superintendents, project managers and their assistants. The Owner, the Construction Manager or the Architect shall have the right to have any supervisory or management staff of the Contractor removed from the Project with or without cause.

I. Each Contractor shall provide, or otherwise see that, the project manager, on site superintendent(s), site manager(s), and/or supervisory workers of each Contractor and major subcontractor are equipped with cellular phones and/or radios. Each Contractor shall provide the Owner, the Construction Manager and the Architect with the number for each phone and/or radio of such individuals.

J. The Contractor's supervisory personnel, including on site superintendent(s) and their assistants, shall be versed in the English language. In the event the Contractor's supervisory personnel, superintendents and/or their assistants are not versed in the English language, the Contractor shall employ the services of a full-time on-site interpreter at no cost to the Owner to facilitate communications with such supervisory personnel, superintendents and/or assistants, Architect and/or Construction Manager.

K. Prior to the commencement of work, the Contractor shall provide the Construction Manager and the Architect with:

1. a written list of the names, addresses and telephone numbers of the members of its organization who can be contacted in the event of an off-hours emergency at the building site, including cellular telephone numbers and personal/home telephone numbers.

2. a written list of Subcontractors, sub-Subcontractors, suppliers and vendors with names, addresses, telephone numbers, and descriptions of the work they shall perform or furnish.

3. The name, address and telephone number of the bonding company, banking and insurance company(ies) retained by the Contractor including the name, address and telephone number of each bonding company's primary contact representative for this Project.

4. Detailed Subcontractor schedules indicating the approximate quantity of shop drawings, sequence, timing and man loading.

5. A cash flow projection for the life of the Project, including a schedule and graph showing the amount of work projected to be completed each month or billing period and a dollar value for the anticipated billings each month or billing period. This shall be completed after an agreed upon schedule of values has been approved by the Construction Manager.

L. 1. Tests, inspections and approvals of portions of the Contractor's work required by the Drawings and/or Specifications in the Project Manual shall be made at an appropriate time. Unless otherwise provided, the Contractor shall consult with the Architect and the Construction Manager concerning the need for testing and/or inspection of its work pursuant to the Contract Documents and, after consulting with the Architect and Contractor, the Construction Manager shall advise the Owner to 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. The Owner shall bear all costs associated with the tests, inspections or approvals required by the Contract Documents except as set forth in subparagraphs 2 and 3 hereof.

2. Tests, inspections, and approval of portions of the Contractor's work required by all federal, state, and local laws, ordinances, regulations, rules, codes, orders, and policies of public authorities or governmental agencies having jurisdiction will be made at an appropriate time. The Contractor shall consult with the Architect and the Construction Manager concerning the need for testing and/or inspection of its work pursuant to law, ordinance, regulation or orders of public authorities or governmental agencies and shall advise the Owner in writing that it has made arrangements for such tests, inspections and approvals with the appropriate public authority or governmental agency. The Contractor shall be solely responsible for making timely notice of the need for a test, inspection and/or approval with the relevant public authority or governmental agencies and shall bear all costs associated with such testing, inspection or approval required by such public authority or governmental agency.

3. If the Architect, the Construction Manager, the Owner, or public authorities or governmental agencies having jurisdiction determine that portions of the Contractor's work require additional testing, inspection or approval due to the Contractor's failure to perform its work in accordance with the requirements of the Contract Documents and/or laws, ordinances,

rules, regulations or orders of public authorities or governmental agencies having jurisdiction, the Architect and the Construction Manager will advise the Owner of the need for such additional inspections or tests and the Owner shall make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner. The Contractor shall bear the costs of such additional testing as provided in Article 14.

M. The Contractor shall, if required by federal, state, or local laws, ordinances, regulations, rules, codes, orders, and/or policies of the governing agencies having jurisdiction over this Project, retain a licensed professional engineer to supervise the construction of this Project including, but not limited to, foundations, structural work, soils, welding, reinforced masonry and the like.

N. The Contractor recognizes and acknowledges that the within Project is governed by and subject to the provisions of New York State General Municipal Law, section 101, governing the award of contracts on public improvement projects. As such, the Contractor recognizes and acknowledges that other contractors will be performing work on the Project in conjunction with it. As such the Contractor agrees to cooperate with such other contractors performing work on the Project and shall perform its work as follows:

1. The Contractor shall not interfere with the erection, installation or storage upon the premises of any work, materials, supplies or equipment which is to be performed and/or furnished by other contractors, and the Contractor shall properly connect and coordinate its work therewith.

2. The Contractor shall not commit or permit any act which will interfere with the performance of the work of any other contractor performing work on the Project. If the Contractor sustains any damage through any act or omission of other contractors having a contract with the Owner, or through any act or omission of a subcontractor of such contractor, the Contractor shall promptly notify the Owner and the Construction Manager of such damage.

3. To the fullest extent permitted by law, the Contractor agrees to defend, indemnify and hold harmless Owner, Architect, Construction Manager, and their respective Consultants and Sub-consultants, officers, directors and employees from all claims made against any of them arising out of Contractor's acts or omissions or the acts or omissions of any officer, director, employee and/or Subcontractor of the Contractor which have caused damage to the Owner, Architect, Construction Manager or other contractor(s) on the Project or their respective officers, directors and/or employees. The Owner's right to indemnification hereunder shall in no way be diminished, waived or discharged, by the exercise of any other remedy provided for by contract or by law. Further, the Owner may withhold from an offending Contractor's contract sum an amount sufficient to cover such damage and all expenses and costs associated with the damage sustained.

4. When the work of the Contractor or its Subcontractors overlap or dovetail with that of other Contractors, materials shall be delivered and operations conducted to carry on the work continuously, in an efficient, workmanlike manner.

5. In case of interference between the operations of different Contractors, the Construction Manager will be the sole judge of the rights of each Contractor and shall have the authority to decide in what manner the work may proceed, and in all cases its decision shall be final. Any decision as to the method and times of conducting the work or the use of space as required in this paragraph shall not be the basis of any claim for delay or damages by the Contractor.

6. The Contractor, including its Subcontractors, shall keep itself informed of the progress of other contractors and shall notify the Architect or the Construction Manager immediately in writing of lack of progress on the part of other contractors where such delay will interfere with its own operations. Failure of the Contractor to keep informed of the work progressing on the Project and failure to give notice of lack of progress by others shall be construed as acceptance by the Contractor of the status of the work as being satisfactory for proper coordination with the Contractor's own work.

7. Delays or oversights on the part of any Contractor or Subcontractor in getting any or all of their work done in the proper way, thereby causing cutting, removing and replacing work already in place, shall not be the basis for a claim for extra compensation.

8. If part of the Contractor's work depends for proper execution or results upon construction or operations by the Owner or another contractor, the Contractor shall, prior to proceeding with that portion of its work, promptly report to the Architect and Construction Manager 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 or other contractor's completed or partially completed construction is fit and proper to receive the Contractor's work.

9. The Contractor shall promptly correct discrepancies or defects in its work which have been identified by other contractors as affecting proper execution and results of the work of such other contractor.

O. 1. The Contractor shall comply with and give notices required by all federal, state, and local laws, ordinances, regulations, rules, codes, orders, and policies of public authorities or governmental agencies bearing on performance of the work. If the Contractor fails to give such notices, it shall be liable for and shall indemnify and hold harmless (a) the Owner, its consultants, employees, officers and agents, (b) the Architect and its consultants, employees, officers and agents, and/or (c) the Construction Manager and its consultants, employees, officers and agents against any resulting fines, penalties, judgments, or damages, including reasonable attorney's fees, imposed on or incurred by the parties indemnified hereunder. The Contractor shall pay any costs or fees incurred in such compliance and any fines or penalties imposed for violation thereof and any costs or fees incurred by the Owner due to such violation.

2. The Contractor shall pay any costs or fees incurred in such compliance and any fines or penalties imposed for violation of any laws, ordinances, building codes, rules, regulations and lawful orders of public authorities or governmental agencies applicable to the Project, Contractor or Contractor's work as well as any costs or fees incurred by the Owner due to any such violation. If the Contractor observes that portions of the Contract Documents are at variance therewith, the Contractor shall promptly notify the Architect and Owner in writing, and necessary changes shall be accomplished by appropriate modification to the Drawings and/or Specifications.

3. If the Contractor performs work knowing it to be contrary to laws, statutes, ordinances, building codes, rules and/or regulations without such notice to the Architect, the Construction Manager and Owner, the Contractor shall assume full responsibility for such work and shall bear the attributable costs and shall bear the total cost for correction of same.

P. The Contractor recognizes and acknowledges that job meetings will be held at the job site weekly unless otherwise designated by the Owner, the Architect or the Construction Manager. The Contractor shall have responsible representation at the MANDATORY weekly job meetings held at the Construction Manager's job office. These meetings will be held to arrange for satisfactory coordination of all trades on the Project so as not to impede job progress. Contractors or subcontractors failing to attend job meetings shall be responsible for delays and/or expenses incurred due to coordination difficulty.

Q. The Contractor shall provide copies of its daily construction reports to the Construction Manager's Field Superintendent. These reports shall be submitted no later than 10:00 am the following workday. The daily reports shall provide detailed information concerning the Contractor's activities and operations, including work activities on site and manpower. In addition, the Contractors are to submit a Two Week Look Ahead schedule for upcoming work.

ARTICLE 4
CONTRACTOR'S USE OF SITE

A. The Contractor shall confine operations at the site to the areas at which construction is to be performed and to such areas permitted by law, ordinances, permits and as set forth in detail in the Project Manual and Drawings forming a part of its contract with the Owner.

B. Five (5) days after receipt of the Notice to Proceed, the Contractor shall provide two (2) copies of a video tape recording of all existing conditions to the Construction Manager. This taping shall provide a record of all existing buildings, grounds, exterior conditions and interior conditions. The Contractor shall schedule a representative of both the Owner and the Construction Manager to be present at this taping. In the absence of this record, the Contractor shall be responsible for paying the costs associated with any and all repairs in an area where the Contractor is working or has worked, as may be deemed necessary by the Owner or the Construction Manager.

C. The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy.

D. 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. The Contractor shall exert utmost care and diligence when working in or near any existing buildings or sitework. The absence of protection around such items shall not excuse the Contractor from its obligation to provide protection. Any damage to existing buildings, sitework or facilities shall be repaired and charged to the Contractor responsible for the damage.

6. The Contractor shall be responsible for the removal and replacement of existing ceiling tiles and grid in areas of the existing building where its work is required and new ceilings are not scheduled for installation. In the event that the existing ceilings are damaged and cannot be replaced to the satisfaction of the Owner, the responsible contractor shall be liable for the costs of replacing, in kind, the existing ceilings with new tile and grid.

7. All disconnect and/or tie-in work involving any utilities that would interfere with the ongoing operations of the Owner shall be completed after hours when the facility is not in use. The performance of this work shall be projected on all schedules required to be prepared by

the Contractor. Additionally, the Contractor shall give the Construction Manager and the Owner at least forty-eight (48) hours advance notice of its intention to perform this type of work. All overtime and standby personnel necessary to complete these tie-ins shall be the responsibility of the Contractor performing the work and included within the contract sum of such Contractor. "After hours" refers to the time before and after the hours school is in session for academic instruction. During this time, students and staff may occupy portions of the facility but may be redirected to allow work by the Contractor.

E. 1. Separation of construction areas from occupied spaces: Construction areas which are under the control of a contractor and therefore not occupied by School 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. Methods of dust and fume control shall include, but not be limited to:

a. Adequate ventilation;

b. Wetting down;

c. Keeping bags of insulating materials, cement, and other materials, closed;

d. Controlled mixing of materials under field conditions;

e. Special attention should be utilized in sawing of insulation and certain acoustical materials and storage of materials;

f. Job housekeeping must be maintained; and

g. Advising all personnel of hazardous conditions, including supervisors and workers.

Each contractor is responsible for instituting the above policies to ensure minimal impact to surrounding occupied areas.

2. 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.

3. 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.

4. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each workday. School buildings occupied during the Project will be maintained by the Contractor so as to meet required health, safety and educational capabilities at all times that classes are in session.

F. 1. Storage space will be allotted to the Contractor by the Owner or Construction Manager to the extent such space, in the sole discretion of the Owner, is available. The Contractor shall be responsible for securing appropriate space for its material with the Construction Manager prior to delivery. If sufficient space is not available on the site, the Contractor shall provide local off-site storage, storage containers, etc. at its own cost and expense. Should any of the material stored on-site obstruct the progress of any portion of the work or the Project, this material shall be removed by the Contractor without reimbursement of cost, from place to place or from the premises, as the Construction Manager may direct.

2. The Contractor shall schedule delivery of materials and equipment to minimize long term storage at the Project site(s), to prevent overcrowding of construction spaces, and to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

3. The Contractor shall deliver materials and equipment to the Project site(s) in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installation. The Contractor shall inspect materials and equipment upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected. The Contractor shall store products to allow for inspection and measurement of quantity or counting of units. The Contractor shall store materials in a manner that will not endanger the Project structure. The Contractor shall store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation. The Contractor shall comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

4. The Contractor shall not unreasonably encumber the site with materials or equipment during the performance of its work. Only materials and equipment which are to be used directly in the performance of the Contractor's work shall be brought to and stored on the premises of the School District. After equipment is no longer required for its work, the Contractor shall promptly remove such equipment from the premises of the School District. The Contractor shall be solely responsible for the protection of construction materials and equipment stored on the premises of the School District from weather, theft, damage and all other adversity. The Contractor shall at all times provide the proper housekeeping to minimize potential fire hazards and shall provide approved spark arresters on all steam engines, internal combustion engines and flues.

5. A construction entrance will be designated for deliveries. A separate entrance will be established for entering and exiting the site only. All deliveries shall be scheduled and coordinated with the Construction Manager and the Owner's Security department. Unexpected or uncoordinated deliveries may be turned away by the Owner or the Construction Manager at the discretion or necessity of the Owner. The Owner's enforcement of this provision shall not be construed by any Contractor or Subcontractor as the basis for a claim of delay in time or monetary damages alleged to have been incurred as a result of refusal of delivery.

6. The Contractor for General Construction shall provide necessary and required security measures to adequately safeguard the construction site from vandalism and intrusion of unauthorized persons. The Contractor for General Construction shall submit its means and methods of security to the Construction Manager for review and comment. The project site(s) must be secured 24 hours a day, 7 days a week including holidays. The General Construction Contractor's failure to secure the site as required by this paragraph will result in the Owner engaging the services of such necessary personnel so as to provide such security. To the extent practicable, notice will be given the Contractor for General Construction of the Owner's intention to engage such security services and all costs and expenses associated with the Owner's security of the site in this regard will be back charged to the Contractor for General Construction. While the Owner may have security guards patrolling the Project areas, the function of such security guards is not for the purpose of specifically guarding the Contractor's property or operations of work.

G. The Contractor's right to entry and use of the School District premises arises solely from the permission granted by the Owner pursuant to the agreement between the Contractor and the Owner. This permission shall be deemed to be withdrawn upon the termination of the Contractor's agreement with the Owner.

H. 1. The Contractor shall be required to perform its work with no interruption to the School District's operations, including its administrative and business operations. Any work which will interfere with the School District's operations and/or which is to be performed when the School District's facilities are in operation shall be performed on evenings and weekends. Additionally, the Contractor shall conduct its work in compliance with federal, state, county or local ordinances. All costs incurred by the Owner to make the facilities available during evening and weekends shall be borne by the Contractor. The Owner reserves the right to determine what work will "interfere" with its operations and said determination shall be final.

2. The Contractor may request access to the Project site(s) during times beyond the work hours permitted. Approval is solely at the discretion of the Owner. If approval is given, the Contractor is responsible for paying all additional costs incurred by the Owner, Architect and the Construction Manager for providing the site to the Contractor during the additional time periods.

3. In the event the Contractor fails to complete all work under the Contract Documents by said scheduled dates unless the Owner in its sole discretion grants the Contractor permission to work during normal school hours, the Contractor will not be permitted to perform

any work during normal school hours. Such work shall only be performed after school hours, Saturdays, Sundays, holidays or periods when school is unoccupied at no additional cost of any kind to the Owner. In addition to damages incurred by the Owner in connection with the Contractor's delay, the Contractor shall be liable for all costs incurred by the Owner to provide staff, Architect and Construction Manager personnel as required to make buildings and/or facilities accessible by Contractor and perform inspections during such off hours.

4. The Owner shall not be responsible for any overtime charges incurred by the Contractor during the course of this Project. Any and all costs associated with work which is performed at hours requiring the payment of such overtime by the Contractor to its workers shall be the Contractor's responsibility.

I. 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.

J. The Contractor shall provide all required temporary access walkways, both interior and exterior, and the like necessary to complete its work. The Contractor shall maintain an unobstructed condition at all entrances and/or exits from present buildings. No equipment, other than equipment with rubber tires, will be allowed on any existing or new pavement, UNLESS THE CONTRACTOR HAS OBTAINED THE PRIOR APPROVAL OF THE CONSTRUCTION MANAGER AND THE PAVEMENT HAS BEEN FIRST PROTECTED WITH PLANKING OR BY OTHER MEANS APPROVED BY THE CONSTRUCTION MANAGER.

K. The Contractor and any entity for whom the Contractor is responsible shall not erect any sign on the premises of the School District without the prior written consent of the Owner, which consent may be withheld at the sole discretion of the Owner.

L. 1. Without the prior approval of the Owner, the Contractor shall not permit any workers to use any existing School District facilities, including, without limitation, lavatories, toilets, entrances and parking areas other than those designated by the Owner. Employees, vehicles, and equipment of the Contractor and of all others engaged by the Contractor for the performance of its work shall enter onto the premises of the School District for which construction work is to be performed only at those locations designated or approved by the Construction Manager. The parking for construction personnel shall be limited to the areas designated by the Owner. Failure to abide by this rule will result in towing of cars at the expense of the Contractor who employs the individual.

2. The Contractor shall ensure that its work, at all times, is performed in a manner that affords reasonable access to both vehicles and individuals to the premises of the School District and all adjacent areas. The Contractors' work shall be performed, to the fullest extent possible, in such a manner that areas in and around the construction area shall be free from all debris, building materials and equipment likely to cause hazardous conditions, and do not close or obstruct walkways, roadways or other occupied facilities or facilities to be used by the Owner. Without limitation to any other provision of the Contract Documents, the Contractor shall use

its best efforts to minimize any interference with the occupancy of areas, buildings, entrances, and parking areas in and around the premises at which work is being performed. Unobstructed access to fire hydrants and standpipe connections shall be maintained at all times during construction operations, and portable fire extinguishers shall be provided by the Contractor and made conveniently available throughout the construction site.

3. The Construction Manager, in conjunction with the Owner and the Architect, shall designate locations at the site that the Contractor, its Subcontractors and employees may utilize in connection with its work. The Contractor's employees and the employees of the Contractor's Subcontractors and others engaged by the Contractor to perform its work are prohibited from trespassing or leaving any vehicle on any property not assigned by the Owner as set aside for the use of the Contractor. The Contractor's employees and the employees of the Contractor's Subcontractors and other engaged by the Contractor to perform its work are restricted to the immediate area at which work is to be performed. Only persons having official business will be admitted to the construction site. NO COMMUNICATION BETWEEN THE CONTRACTOR, ITS EMPLOYEES, SUBCONTRACTORS' EMPLOYEES, OR OTHERS ENGAGED BY THE CONTRACTOR FOR THE PERFORMANCE OF ITS WORK AND THE OWNER'S STUDENTS OR STAFF WILL BE PERMITTED.

4. The Contractor, its employees, its Subcontractors and their employees or agents, and all others engaged by the Contractor in connection with the performance of its work are required to wear photographic identification badges at all times. The Contractor shall provide such individuals with said photographic identification badges. These badges shall be worn so as to be readily and easily visible. All workers and representatives of the Contractor, its Subcontractors or suppliers shall wear these badges while on school property. The information on these badges shall be as prescribed by the Owner and the Construction Manager. Each person seen without a photo identification badge (or otherwise failing to comply with this requirement in the opinion of the Owner or the Construction Manager) shall be ordered to leave school property. No warnings shall be necessary. The Contractor(s) and their Subcontractor(s) employing the offending person(s) shall be solely responsible for making-up and paying for any loss of production or required progress in the work resulting from this action (including any claims by other Contractors dependent on the work of this Contractor). All parties agree that any action taken to enforce this requirement shall not be construed by any Contractor or its Subcontractors or suppliers as the basis for a claim (for either time or money) for delay to the work or to the Contractor, its Subcontractors, employees or suppliers.

5. Without limitation of any other provision of the Contract Documents, the Contractor shall use its best efforts to comply with all rules and regulations promulgated by the Owner in connection with the use and occupancy of the premises of the School District. The Contractor shall immediately notify the Owner in writing if during the performance of its 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 an alternative through which the same results intended by such portion of the rules and regulations can be achieved. The Owner may, in the Owner's sole discretion, adopt such suggestions, develop new alternatives or require compliance with the existing requirements of the rules and regulations.

M. No drinking of alcoholic beverages, smoking/vaping or use of controlled substances, cigarettes or marijuana/THC is permitted on the premises of the School District. The Contractor shall insure that none of its or its Subcontractors, employees, suppliers, agents, and/or consultants who report to the Project site(s) are impaired by alcohol or controlled substances. The Contractor bears the responsibility of determining if its, or its subcontractors, employees, suppliers, agents or consultants are in any way impaired and whether the safety of the public, the employees of other Contractors and their Subcontractors, the Owner, Architect, or Construction Manager are jeopardized. Each Contractor shall provide drinking water for its own employees.

N. The Contractor's employees, representatives, Subcontractors, suppliers, agents and consultants, and all of its Subcontractors' employees, representatives, agents and consultants at the site are to refrain from using indecent language. All doing so will be removed from the site. Artwork or decoration found on vehicles belonging to Contractor or Subcontractor employees parked on or near the school property which contain indecent language or pictures shall either be covered or removed from the location.

O. The Contractor's employees, representatives, suppliers, agents and consultants, and all of its Subcontractors' employees, representatives, suppliers, agents and consultants at the Project site(s) are to wear shirts, long pants and proper footwear.

P. Each Contractor shall keep the premises and surrounding area in which it is working free from accumulation of waste materials or rubbish caused by the performance of the work being performed on-site and in the buildings. On a daily basis at the conclusion of work on the Project, each Contractor shall clean the areas in which it has performed work and shall remove all waste, materials, rubbish, its tools, construction equipment, machinery and surplus materials. Each Contractor shall broom sweep all construction areas in which it has performed work every day. The Construction Manager shall perform an inspection each afternoon to determine that the work areas of the Contractors have been properly cleaned. In the event the work areas are not cleaned, the Construction Manager shall advise the offending Contractor to provide cleaning as required herein. If any Contractor fails to keep the site safe and clean within four (4) hours of being notified by the Construction Manager, either verbally or in writing, the Construction Manager will have the clean up work performed and back charged to the offending Contractor without further notification to the Contractor. The cost of such cleaning company, together with the cost of any custodial costs of the School District, at prevailing overtime rates plus 15% will be charged to the offending Contractor. Notice to field personnel shall be deemed notice to the Contractor.

Q. The Contractor shall provide ventilation of enclosed areas during construction as may be required to permit proper curing and drying out and to prevent excessive humidity, moisture and condensation. Ventilation shall be by natural or artificial means as required by the conditions involved.

R. The Contractor shall be responsible for the control of chemical fumes, gases and other contaminates produced by welding, gasoline or diesel engines, roofing, paving, painting, and any other activities to ensure that they do not enter occupied portions of the building or air intakes.

S. The Contractor shall be responsible for ensuring that activities and materials which result in "off-gassing" of volatile organic compounds such as glues, paints, furniture, carpeting, wall covering, drapery, or any other materials are scheduled, cured or ventilated in accordance with manufacturers' recommendations before a space can be occupied.

T. From the commencement to the completion of the Project, the Contractor shall keep the parts of the work and the buildings free from accumulation of water no matter what the source or cause of water.

U. 1. The Contractor shall construct temporary partitions where shown on the Drawings or where otherwise required for safety of the public or to prevent dust from entering occupied areas. Partitions shall be dust-proof from floor to slab or structure above (if existing condition is a drop in tile ceiling, Contractor shall remove tile and install partition to structure above). In addition to framing and sheetrock, the Contractor shall install fire resistant plastic partitions on the work area side of its work. If an access door is required, an alternating 3 layer plastic system shall be used. The door shall be a standard hollow metal door with lockset and closer. Keys shall be distributed to the Owner's other contractors, the Owner, the Architect, and the Construction Manager.

2. All cutting and welding performed within an occupied building or adjacent to a window or intake vent shall be performed during off hours.

V. 1. The Contractor shall control the safe handling and storage of all welding materials, acetylene and oxygen tanks, and other equipment required for welding and cutting work at the Project site(s). Such storage shall be in compliance with OSHA regulations.

2. Welding materials and equipment shall be removed promptly from the School District's premises upon completion of the welding and cutting work.

W. The Contractor shall be responsible for all costs incurred by the Owner as a result of false security/fire alarms set off by the acts or omissions of the Contractor or its Subcontractors, employees, suppliers, representatives, agents and/or consultants. Such costs shall include but not be limited to custodial response charges.

X. The Contractor shall be responsible for broken glass caused by the performance of its work, and at the completion of the work shall replace such damaged or broken glass. After damaged or broken glass has been replaced, the Contractor shall remove all labels, wash and polish both sides of all glass. In addition to general broom cleaning, the General Contractor shall perform the following final cleaning for all trades at completion of the work:

1. Remove temporary protections;
2. Remove marks, stains, fingerprints and other soil or dirt from painted, decorated and natural finished woodwork and other work;
3. Remove spots, plaster, soil and paint from ceramic tile, marble and other finished materials, and wash or wipe clean;
4. Clean fixtures, cabinet work and equipment, removing stains, paint, dirt and dust, and leave same in undamaged, new condition;
5. Clean aluminum in accordance with recommendations of the manufacturer; and
6. Clean all floors thoroughly in accordance with recommendations of the manufacturer.

Y. Where a Contractor other than the General Contractor is the only contractor engaged to perform work, the responsibilities allocated to the General Contractor in these General Conditions shall be performed by such other contractor.

ARTICLE 5
SUBCONTRACTORS

A. 1. As soon as practicable after receipt of Letter of Intent to Award, Notice to Proceed or other form of official notice of award of the Contract, but not more than ten (10) days after receipt of official notice of award of the Contract, the Contractor shall furnish the Owner, the Construction Manager and the Architect, in writing, with (1) the name, trade and subcontract amount for each Subcontractor and (2) the names of all persons or entities proposed as manufacturers of the products identified in the Specifications (including those who are to furnish materials or equipment fabricated to a special design) and, where applicable, the name of the installing Subcontractor. Copies of all Subcontractor contracts, fully executed, are to be provided to the Construction Manager, including but not limited to all addenda, appendices, and/or exhibits including scope of work sheets. All such subcontracts shall be submitted to the Construction Manager within ten (10) days of the Owner's award of a contract to the Contractor or for those subcontracts executed thereafter within ten (10) days of the subcontract being executed by the Contractor and Subcontractor.

2. Upon review of the Contractor's list of Subcontractors, the Architect will advise the Contractor in writing stating whether or not the Owner, the Construction Manager or the Architect, after due investigation, accepts or rejects, any proposed Subcontractor. Subcontractors will not be acceptable unless, when requested by the Architect, evidence is furnished that the proposed subcontractor has satisfactorily completed similar subcontracts as contemplated under the Contractor's contract with the Owner, and has the necessary experience, personnel, equipment, plant, and financial ability to complete the subcontract in accordance with the intent to the Contract Documents. As verification of financial ability, the Owner reserves the right to request and receive up to five (5) years worth of financial statements, bank references, bond/insurance company references and all other information required to assess financial ability.

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 and Architect have no objection. No increase in the Contract Sum shall be allowed where a Sub-contractor is rejected by the Architect, Construction Manager or Owner who is (1) deemed unqualified to perform the particular work subcontracted by the Contractor, (2) does not have the necessary experience, personnel, equipment, plant and financial ability to complete the subcontract, or (3) has a history of poor performance in work of similar nature. Upon receipt of a rejection of a Subcontractor by the Architect, Construction Manager or Owner, the Contractor shall have the right to request a meeting with the Architect, Construction Manager and the Owner to discuss the reasons it believes the Subcontractor is qualified to perform the work. Upon review of such reasons, the Architect, Construction Manager and/or Owner shall re-consider its determination and shall advise the Contractor of its determination upon such review. If the Architect, Construction Manager or Owner still finds that such Subcontractor does not meet the requirements above-stated, it shall advise the Contractor. The Architect's determination upon such review shall be final and binding on the Contractor and its Subcontractor and the Contractor hereby waives any and all claims it or its Subcontractor might have against the Owner, the Construction Manager and/or the Architect concerning the rejection of such Contractor and shall require its Subcontractors to execute such similar waiver in its agreement with the Contractor.

4. The Contractor shall not change a Subcontractor, person or entity previously selected if the Owner, Construction Manager or Architect makes reasonable objection to such change.

B. By appropriate agreement, the Contractor shall require each Subcontractor to be bound to the Contractor by the terms of the Contractor's agreement with the Owner and by the terms of the Contract Documents as defined therein, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by said agreement and Contract Documents, assumes toward the Owner, the Construction Manager and the Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, Construction Manager and Architect under the Contractor's agreement with the Owner so that subcontracting thereof will not prejudice such rights, and shall allow 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 its agreement with the Owner, has against the Owner. However, the Subcontract agreement between the Contractor and Subcontractor shall not provide, nor shall the Contractor's agreement with the Owner be deemed to provide any rights, remedies or redress by the Subcontractor(s) against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors.

C. The Contractor shall promptly notify the Owner, Construction Manager and Architect of any material defaults by any Subcontractors and/or whether it has terminated its agreement with any of its Subcontractors for any reason.

D. The Contractor hereby assigns all of its rights in its agreements with its Subcontractor(s) and hereby does assign, transfer and set over to the Owner all of its rights and/or interests in its agreements with its Subcontractor(s), but only in the event of termination of the Contractor's agreement with the Owner pursuant to Article 17, paragraph A of these General Conditions of the Contract for Construction and only to the extent the Owner implements its rights to take such assignment of contract by notifying the Subcontractor in writing of its intention to do so. Such an assignment is subject to the prior rights of the surety, if any, obligated to the Owner pursuant to a performance bond submitted in connection with the Contractor's work.

E. If the work in connection with a subcontract has been suspended for more than ninety (90) days after termination of the Contract by the Owner and the Owner accepts assignment of such subcontract, the Subcontractor's compensation shall not be adjusted for any increase in direct costs incurred by such Subcontractor as a result of the suspension.

F. It shall be the Contractor's responsibility, when sub-contracting any portion of the Contractor's work, to arrange or group items of work under particular trades to conform with then prevailing customs of the trade, regardless of the particular Divisions and Sections of the Specifications in which the work is described.

G. All subcontracts must be in writing.

ARTICLE 6
CONTRACTOR'S USE OF DRAWINGS/SPECIFICATIONS

A. The intent of the agreement between the Owner and the Contractor is to include all items necessary for the proper execution and completion of the work to be performed by the Contractor. The Contract Documents comprising the agreement between the Contractor and the Owner are complementary, and what is required by one shall be as binding as if required by all.

B. 1. In the event of inconsistencies within or between parts of the Contract Documents or between the Contract Documents and applicable standards, codes and ordinances, the Contractor shall (a) provide the better quality or greater quantity of work or (b) comply with the more stringent requirement; either or both in accordance with the Architect's interpretation.

2. On the Drawings, given dimensions shall take precedence over scaled measurements and large scale drawings over small scale drawings.

3. Before ordering any materials or performing any of its work, the Contractor and each Subcontractor shall verify measurements at the Project site and shall be responsible for the correctness of such measurements. No extra charge or compensation will be allowed on account of differences between actual dimensions and the dimensions indicated on the Drawings. Any difference which may be found shall be submitted to the Architect for resolution before proceeding with the performance of the work.

4. If a minor change in the work is found necessary due to actual field conditions, the Contractor shall submit detailed drawings of such departure for the approval by the Architect before making the change.

5. Drawings, in general, are made to scale, but all working dimensions shall be taken from the figured dimensions or by actual measurements at the Project and in no case by scaling. The Contractor shall study and compare all Drawings and verify all figures before laying out or constructing the work and shall be responsible for any and all errors in his work which might have been avoided thereby. Whether or not an error is believed to exist, deviation from the Drawings and the dimensions given thereon shall be made only after approval in writing is obtained from the Architect.

6. In the event addenda are issued and contain changes to the Drawings and/or Specifications, the provisions in the addenda supersede previously issued Drawings and/or Specifications.

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

D. Unless otherwise stated in the Contract Documents, words and abbreviations which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

E. The Contractor, and all Subcontractors, shall refer to all of the Drawings, including those showing the work of others performing work in connection with the Project, including but not limited to the General Contractor (if any), the Plumbing Contractor, the Heating, Ventilation, Air Conditioning Contractor, Electrical Contractor and other specialized trades, and to all of the divisions of the Project Manual, and shall perform all work reasonably inferable therefrom as being necessary to produce the indicated results.

F. All indications or notations on the Drawings which apply to one of a number of similar situations, materials or processes shall be deemed to apply to all such situations, materials or processes wherever they appear in the work, except where a contrary result is clearly indicated by the Drawings or Project Manual. All work mentioned or indicated in the Drawings or Project Manual shall be performed by the Contractor unless it is specifically indicated therein that the work is to be performed by others.

G. The Drawings, Specifications and other documents prepared by the Architect are instruments of the Architect's service through which the Contractor's work is to be performed. The Contractor may retain one contract record set during the course of the Project. Neither the Contractor nor any Subcontractor, Sub-subcontractor or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications or other documents prepared by the Architect, and unless otherwise indicated the Architect shall be deemed the author of them and will retain with respect to the Contractor, Subcontractor or sub-Subcontractor all common law,

statutory and other reserved rights, in addition to the copyright. All copies of them, except the Contractor's record set, shall be returned or suitably accounted for to the Architect, on request, upon completion of the work.

H. The Drawings, Specifications and other documents prepared by the Architect, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or material or equipment supplier on other projects without the specific written consent of the Owner and Architect. The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect appropriate to and for use in the performance of its work pursuant to its agreement with the Owner. All copies made under this license shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the Architect. 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's copyright or other reserved rights. Upon payment to the Architect by the Owner for the preparation of the Contract Documents (which include but are not limited to the Drawings and Specifications), the Owner shall become a joint owner of the Contract Documents and may use and reproduce them for any purpose.

I. Upon written request of the Contractor and to they are in existence at the time of said request, the Owner shall furnish surveys describing physical characteristics of the Project site(s), legal limitations and utility locations for the Project sites. Nothing herein shall be construed as requiring the Owner to generate any document which it does not possess at the time of the request by the Contractor. In the event that the survey provided does not clearly delineate the metes and bounds of the Owner's property, the Contractor shall stop work and immediately notify the Architect, Construction Manager and the Owner. The Contractor shall NOT proceed with its work until it receives written permission from the Construction Manager and/or the Architect. The Contractor shall be fully responsible for all costs arising from non-compliance with this provision. Any delays associated with this provision shall not serve as a basis for a claim by the Contractor.

J. From the basic data established by the Owner, the General Contractor shall establish reference control points and complete the layout of the work. Each Contractor is responsible for utility markouts as it pertains to the scope of their work and maintain markout during work. Sketch of layout with reference points to be given to Construction Manager and Architect at the time of markout.

K. The Contractor shall be responsible for all measurements that may be required for execution of the work to the exact position and elevation as prescribed in the Specifications, shown on the Drawings, or as the same may be modified at the direction of the Architect to meet changed conditions.

L. The General Contractor shall be responsible for the establishment of points, wall and partition lines required by the various Contractors and Subcontractors in laying out their work.

M. Each Contractor shall furnish such stakes and other required equipment, tools and materials, and all labor as may be required in laying out any part of the work from the base lines and benchmarks established by the Owner.

N. 1. The General Construction Contractor shall establish a baseline and benchmark system for each building addition, area of renovation or component using the services of a licensed professional surveyor. The surveyor(s) employed to establish this system or to extend and maintain an existing benchmark system for the work of other trades shall have not less than five years of experience in performing construction surveys similar to the work they will perform for the Project. The remaining Contractors and their respective Subcontractors shall be responsible for extending these lines, levels and grades, and for performing all layout for their own work. The Contractor is solely responsible for any damage or loss due to incorrect extension of lines, level or grades in their layout. The Contractor and its subcontractors shall be responsible for the accuracy with respect to the layout of their work. Any discrepancies or errors in the Drawings perceived by another contractor or subcontractor shall be immediately reported to the Construction Manager. If any corrections are necessary, they shall be executed in accordance with the terms and provisions of these General Conditions.

2. The Contractor and its Subcontractors shall be responsible to offset or to protect their markings from anything that may disturb them.

3. Every Contractor shall work off the lines and elevations established and maintained as the baseline and benchmark system.

4. Each Contractor is responsible for the accuracy of its own work.

O. The Architect may require that construction work be suspended at any time when location and limit marks established by the Contractor are not reasonably adequate to permit checking completed work or the work in progress.

P. Except for the basic building permit, the Contractor shall be responsible for securing and maintaining for the life of the Project: all permits, P.E. licenses, connection fees, inspections, etc. applicable to, or customarily secured for the work. This provision includes any permits to be issued in the name of the Contractor required for the work. Originals of all permits are to be issued in the name of the Contractor as required for the work. The Contractor shall furnish the Construction Manager with original copies of all permits prior to the commencement of the work and shall prominently display a copy of all permits at a location approved by the Construction Manager.

Q. The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Errors, inconsistencies or omissions discovered shall be reported to the Architect at once.

R. The exactness of grades, elevations, dimensions, or locations given on any Drawings issued by the Architect, or the work installed by other contracts, is not guaranteed by the Architect or the Owner. The Contractor shall, therefore, satisfy itself as to the accuracy of all grades, elevations, dimensions, utilities and locations. In all cases of interconnection of its work with existing or other work, it shall verify at the site all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to so verify all such grades, elevations, locations or dimensions shall be promptly rectified by the Contractor without any additional cost to the Owner.

S. 1. The Contractor shall give the Architect timely notice of any additional design drawings, specifications, or instructions required to define its work in greater detail, or to permit the proper progress of its work. To the extent the Architect advises the Contractor that the existing design drawings, specifications and/or instructions given are sufficiently detailed for the Contractor to perform its work, the Architect shall be under no obligation to further clarify or define the work to be performed. In all other circumstances, the Architect shall issue a field order which responds to the request for information.

2. Requests for Information (RFIs) are for requests on clarifications or questions on Drawings and Specifications, not contract terms, scheduling items, or general correspondence, nor, as a means to describe or request approval of alternate construction means, methods or concepts or substitution or materials, systems means and methods. The Contractor shall fill all RFIs out in accordance with the provisions of the Project Manual. Neither the Architect nor the Construction Manager shall fill said forms out on the Contractor's behalf.

T. The Contractor shall, prior to the start of any portion of the work:

1. review any specified construction or installation procedures, including those as may be recommended by the proposed manufacturer;

2. advise the Architect if the specified procedure(s) deviates from good construction practice;

3. advise the Architect if following said procedure(s) will affect any warranty, including the contractor's general warranty;

4. advise the Architect of any objections the Contractor may have to the specified procedure(s); and

5. propose any alternative procedure(s) which the Contractor will warrant.

U. 1. To the fullest extent possible, the Contractor shall provide products of the same kind, from a single source. When two or more items of the same material or equipment are required (pumps, valves, air conditioning units, etc.), they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanged and grooved types), sheet metal, wire, steel bar stock, welding rods,

solder, fasteners, motors for dissimilar equipment units, and similar items used in the work, except as otherwise indicated. The Contractor shall provide products which are compatible within systems and other connected items. If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

2. The Contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

3. With respect to sitework materials, all products submitted for use and incorporated into the Project shall be on the Approved List of Materials and Equipment published by the NYSDOT Materials Bureau, most recent edition.

4. All products submitted for use and incorporated into the Project shall be asbestos free.

V. Equivalents. In the Specifications, one or more kinds, types, brands, or manufacturers of materials are regarded as the required standard of quality and are presumed to be equal. The Contractor may select one of these items or, if the Contractor desires to use any kind, type, brand, or manufacturer of material other than those named in the Specifications, they shall indicate in writing, and prior to award of contract, what kind, type, brand or manufacturer of material is included in the base bid for the specified item. The Contractor shall follow the submission requirements for substitutions as set forth in Article 6.W below.

W. 1. Substitutions. If the Contractor desires to substitute any kind, type, brand, or manufacturer of material other than those named in the Specifications, the Contractor shall indicate the desired substitution in its bid, including the following:

a. For which specified material or equipment the request for substitution is being made;

b. What kind, type, brand, or manufacturer is sought to be substituted for the specified items; and

c. Written documentation evidencing that the substituted material or equipment meets or exceeds the Specifications for materials and/or equipment set forth in the Project Manual. Such documentation shall include, but not be limited to, a full explanation of the proposed substitution, together with a submittal of all supporting data including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, significant qualities of proposed substitution (e.g., performance, weight, size, durability and visual effects), and other like information necessary for a complete evaluation of the

substitution. Additionally, the Contractor shall provide material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated. All such data shall be provided to the Architect and Owner at the Contractor's sole expense. The Contractor's written explanation shall also include a list of reasons the substitution is advantageous and necessary, including the benefits to the Owner and the Project in the event the substitution is acceptable. Additionally, the Contractor shall submit to the Architect information describing in specific detail how the proposed substituted product differs from the quality and performance required by the base specifications, and such other information as may be required by the Owner or the Architect.

d. 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.

e. Samples, where applicable or requested.

f. 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.

g. Detailed comparison of the difference in cost between the specified product and the proposed substitution including any and all costs associated with changes or modifications needed to other parts of the work and to construction performed by the Owner and/or separate Contractors that will be necessary to accommodate proposed substitution. In the event the substation is accepted, the Contractor proposing the use of the substitution shall bear all costs associated with said changes or modifications.

2. By making said requests in conformance with procedures established herein and elsewhere in the Project Manual, the Contractor:

a. Represents that a representative of it has personally investigated the proposed substitute product and has determined that it is equal to or superior in all respects to that specified.

b. Represents that the warranty for the substitution will be the same, or greater than, that applicable to the specified product.

c. Certifies that the cost data is complete and includes all related costs under the Contract Documents to implement the substitution, including professional services necessary and/or required for the Architect and engineers or their Consultants to implement said substitution and the impact, if any, on the other Contractors to implement the substitution and waives any and all claims for additional costs related to the substitution which subsequently become apparent.

d. Represents that it will coordinate the installation of the accepted substitute, making all such changes to the Drawings effected by the change, including but not limited to the electrical, plumbing, site work and heating and ventilating Specifications as may be required for the work to be complete in all respects.

e. Will provide an affidavit stating that (1) the proposed substitution conforms and meets all the requirements of the pertinent Specifications and the requirements shown on the Drawings and (2) the Contractor accepts the warranty and correction obligations in connection with the proposed substitution as if originally specified by the Architect; and (3) the proposed substitution will have no effect on the construction schedule.

3. Proposals for substitutions shall be submitted with the Contractor's bid.

4. No substitutions will be considered or allowed without the Contractor's submittal of complete substantiating data and information as stated hereinbefore.

X. 1. Submittal of shop drawings, product data, material safety data sheets, samples or similar submittals shall be in accordance with the provisions of the Project Manual.

2. The Contractor represents and warrants that all shop drawings have been prepared by persons and entities possessing expertise and experience in the trade for which the shop drawing is prepared and, if required by the Architect or applicable law, by a licensed engineer, job specific, reviewed by Contractor and stamped by the Contractor.

3. If the Contractor elects to perform its work without approvals, such work shall be at the Contractor's own risk and expense.

4. By approving and submitting shop drawings, product data, samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto and has checked and coordinated the information contained within such submittals with the requirements of its work.

5. The Contractor shall not be relieved of responsibility for deviations from requirements of its work by the Architect's approval of shop drawings, product data, samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and the Architect has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors and/or omissions in the shop drawings, product data, samples or other of its submittals to the Architect, by the Architect's approval thereof.

6. The Architect shall review, approve, reject or take other appropriate action respecting submittals made by the Contractor as set forth in the Project Manual. The Architect shall check for conformance with information given in the Drawings and Project Manual and the design concept expressed in the Contract Documents. Review of such submittals 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 designed by the Contractor, all of which remain the responsibility of the Contractor. Further, the Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of 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. When professional certification of performance characteristics of materials, systems or equipment is required by the Contract Documents, the Architect shall be entitled to rely upon such certification to establish that the materials, systems or equipment will meet the performance criteria required by the Contract Documents.

7. Upon the Architect's rejection of the Contractor's shop drawings, product data, samples and/or other documentation submitted by the Contractor to the Architect, the Contractor shall review the rejection and re-submit such shop drawing, product data, sample and or other document in accordance with the Architect's instruction. The Contractor shall direct the Architect's specific attention in writing or on re-submitted shop drawings, product data, samples, or similar submittals, to the revision(s) which have been made, including revisions not specifically requested by the Architect. Resubmission of rejected documents shall be performed within ten (10) calendar days. No claim for delay or cost shall be accepted as a result of rejected documents.

8. When professional certification of performance criteria of materials, systems or equipment is required of the Contractor, the Architect shall be entitled to rely in a reasonable and professional fashion upon the accuracy and completeness of such calculations and certifications provided, however, if the Architect, in its reasonable and professional judgment considers it advisable, the Architect shall verify the accuracy and completeness of any and all such calculations and/or certifications. In the event any and all such calculations and/or certifications are found to be inaccurate and/or incomplete by the Architect, the Contractor shall assume full responsibility and bear all costs attributable or related thereto, including, without limitation, the expense of the Architect's additional services associated with the verification of such calculations and/or certifications and the expense of the Architect's additional service made necessary by the failure of such calculations and/or certifications to be accurate or complete.

9. If the Architect is required to review the Contractor's submittal more than twice, the Contractor shall bear the cost and expense associated with such additional review.

Y. The Architect will interpret and decide matters concerning performance under and requirements of the Drawings and/or Specifications on written request of the Contractor. Such interpretations may, at the Architect's option, be issued in the form of additional Drawings or instructions indicating in greater detail the construction or design of the various parts of the Contractor's work. Such Drawings or instructions may be forwarded by the Architect to the Contractor by field order, construction change directive or other notice to the Contractor. The Contractor shall execute the work for which it requested an interpretation in accordance with such additional Drawings or instructions without additional cost or extension of its contract time. After a decision has been rendered by the Architect on a matter for which the Contractor sought the Architect's interpretation of the Drawings and/or Specifications, the Contractor shall proceed with the work as directed by the Architect. Failure to proceed with the work in accordance with the Architect's interpretation may be used as a basis for termination of the Contractor's contract pursuant to Article 17 of these General Conditions.

Z. The Contractor shall maintain at the site one record copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to record changes and selections made during construction, and in addition approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and the Construction Manager and shall be delivered to the Construction Manager for submittal to the Owner upon the completion of the Contractor's work.

AA. The Contractor shall maintain at the Project site(s), and shall make available to the Owner, Construction Manager and Architect, one record copy of the Drawings (the "Record Drawings") in good order. The Record Drawings shall be prepared and updated during the prosecution of the Contractor's work. The prints for Record Drawing use will be a set of black line prints provided by the Architect to the Contractor at the start of construction. The Contractor shall maintain said set in good condition and shall use colored pencils to mark up said set with "record information" in a legible manner to show: (i) deviations from the Drawings made during construction; (ii) details in the work not previously shown; (iii) changes to existing conditions or existing conditions found to differ from those shown on any existing Drawings; (iv) the actual installed position of equipment, piping, conduits, light switches, electric fixtures, circuiting, ducts, dampers, access panels, control valves, drains, openings, and stub-outs, etc.; (v) architectural and/or structural changes in the design; and (vi) such other information as the Owner, Construction Manager or Architect may reasonably request. At the completion of the work, Contractor shall transfer all information on record drawings to reproducible drawings with new information clouded and noted. Such drawings shall be stamped with the Contractor's name and "AS- BUILT" in the lower right hand corner. The colored record drawing and the as-built reproducible drawing shall be forwarded to the Construction Manager for delivery to the Owner. Final payment and any retainage shall not be due and owing to Contractor until the Record and/or As Built drawings receive the approval from the Architect and the Owner (and all other closeout requirements are met).

BB. The Contractor shall maintain all approved permit drawings in a manner so as to make them accessible to government inspectors and other authorized agencies. All approved drawings shall be wrapped, marked and delivered to the Owner within sixty (60) days of final completion of the Contractor's work.

CC. Each Contractor shall be furnished, free of charge, 3 copies of the Contract Documents, including but not limited to the Drawings, Project Manuals, and all Addenda. Any and all additional copies will be furnished to the Contractor at the cost of reproduction, postage and handling.

ARTICLE 7
CONTRACTOR'S SAFETY/SECURITY PROGRAM

A. 1. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of its work. Prior to beginning any work, the Contractor shall submit a copy of its corporate safety plan to the Owner and the Construction Manager. Two (2) weeks after receipt of the Notice to Proceed, the Contractor shall provide a Site Safety/Logistics Plan to the Construction Manager. The site logistics plan should minimally include locations of the eight-foot high temporary fence and gates, traffic plans for deliveries and removals, refuse container locations, crane locations, pick locations, boom radium, and lift locations, stockpiles, toilet locations, site water and power locations, and safety protocols. This plan shall also show the location of all staging and storage areas, clearly separating construction and school areas. The logistical information represented by the construction documents shall serve as a minimal guide. Each Contractor is required to submit their corporate safety policy within ten (10) days of receipt of the Notice to Proceed. Said policy must minimally meet OSHA standards and define details concerning the maintenance of a safe work environment and will also define practices for the maintenance of hygiene and minimizing the spread of infectious/contagious diseases. The Contractor shall make the participation of its Subcontractors in its safety program mandatory. A list of key personnel, with addresses and telephone numbers for emergency purposes shall be forwarded to the Owner, Construction Manager and Architect. The Owner and the Construction Manager shall establish a fire coordination procedure and shall forward same to the Contractor for its use during the performance of its work.

2. All laborers, workers, and mechanics employed in the performance of the work of this Project shall be certified as having successfully completed a course in construction safety and health approved by the United States Department of Labor's Occupational Safety and Health Administration that is at least ten (10) hours in duration.

3. The Contractor and its Subcontractors shall conduct their operation in accordance with the Safety Guides for Construction as issued by the NYSED, the Contractors' Safety Program and Section 155.5 of the Regulations of the New York State Commissioner of Education.

4. All safety equipment including hard hats and weather protective gear required for the Contractor to perform its work are to be supplied by the Contractor and/or its subcontractors. Within the designated construction areas, the Contractor's and its Subcontractor's respective employees, superintendents, and/or other agents, are required to wear hard hats and other required and/or essential safety equipment. Each person seen without a hard hat, or otherwise failing to comply with this requirement, will be ordered to leave the Project. No prior warnings will be given by the Owner, Construction Manager or Architect. The Contractor and its Subcontractors shall be solely responsible for making up and paying for any loss of production or required progress resulting from the removal of personnel from the Project as set forth herein including any costs incurred by the Owner in connection with the work of other contractors.

5. The Contractor and its subcontractors shall provide blankets and auxiliary fire protection as part of its construction safety program to prevent damage to adjacent work or materials as a result of its welding or burning operations. Additionally, as part of its construction safety program, the Contractor and its subcontractors shall provide a fire watch, with a fire extinguisher, which is acceptable to the Owner and the Construction Manager.

6. The Construction Manager and/or Owner reserves the right to have all operating equipment periodically inspected by an independent inspector whose findings will be binding. The Contractor, at its own expense, must make corrections within two (2) working days of receiving a written report.

7. All flagmen required for deliveries to the site are to be furnished by the Contractor or its Subcontractors responsible for the delivery. Any and all deliveries crossing the site or student traffic areas shall be escorted by flagmen. All flagmen shall wear orange vests.

B. The Contractor shall schedule weekly safety meetings and each of its Subcontractors must be properly represented at such meetings. The Contractor shall designate a responsible member of the Contractor's organization at the Project site(s) whose duty shall be the prevention of accidents. The Contractor shall notify the Construction Manager in writing of the identity of the Contractor's "OSHA Competent Person Regarding Safety". Said person must be an individual capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Construction Manager and Architect. The Contractor shall take all necessary steps to prevent its employees from disturbing and/or damaging the facility and shall be responsible for preventing the escape of fires set in connection with the construction. The Contractor shall notify its employees and Subcontractors of the location of the nearest fire alarm box at all locations where the work is in progress. On a weekly basis, the Contractor shall submit to the Construction Manager and Architect minutes of its safety meetings, which minutes shall include a list of the individuals present at such meetings.

C. The Contractor and each of its subcontractors shall conduct its/their operation in accordance with all applicable laws, regulations, rules and orders of local, state and federal

governments. The Contractor agrees, in order that the work will be completed with the greatest degree of safety, to conform to the requirements of the Occupational Safety and Health Act of 1970 (OSHA) and the Construction Safety Act of 1969, including all standards and regulations that have been since or shall be promulgated by the governmental authorities which administer such acts. In case of conflicts, the most stringent restrictions will apply.

D. The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

E. 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.

F. The Contractor shall take reasonable precautions for the safety and protection of employees at the Project site(s) and other persons who may be affected by its work, including but not limited to students, staff, employees and agents of the Owner, the Construction Manager and the Architect.

G. The Contractor shall protect and secure its work and the materials and/or equipment to be utilized in connection with its work from diversion, theft, destruction and damage, whether stored on or off the site and whether in its care, custody and control or that of its Subcontractors, sub-Subcontractors, or material suppliers.

H. The Contractor shall take all steps necessary to protect all property at or adjacent to the Project site(s), including but not limited to trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

I. All delivery vehicles/trucks/machinery/or other vehicles permitted on the Project site(s) must be equipped with back-up alarms and enter through the designated access points. The Contractor's failure to demonstrate this ability will result in cancellation of delivery or stoppage of work. All delays associated with such cancellation or work stoppage will be the responsibility of the Contractor responsible for the delivery or work involved.

J. All crane picks, hoisting operations and materials delivery must be coordinated so as not to lift over any occupied area of the building(s). If absolutely necessary, this work shall be done during off hours to ensure the safety of the building occupants. Crane location must be approved by the Construction Manager to ensure the safety of building occupants.

K. The Owner and Construction Manager reserve the right to have all cranes and other hoisting equipment periodically inspected by an independent inspector whose findings will be binding. The Contractor, at its own expense, must make corrections cited by the inspector before continuing work. The Owner and Construction Manager will not assume any

responsibility for the safe operation of any cranes or other hoisting equipment by exercising this right. The Contractor and/or its Subcontractor(s) shall cooperate with the inspector by allowing time for the inspection. The Contractor shall be notified twenty four (24) hours prior to the time of the inspection. These inspections do not release the Contractor from its responsibility, prior to use of any hoisting equipment, to provide all engineering, permits and inspections as required by OSHA or the New York State Education Department or by any local, state or federal laws or regulations or by any other agency or department having jurisdiction prior to use of any cranes or other hoisting equipment. The Contractor shall provide the Construction Manager with copies of any permits, certificates or inspections reports obtained with respect to any cranes or other hoisting equipment to be used at the Project site(s).

L. The Contractor shall use the entrances designated on the site logistic plans and drawings for personal vehicles, trucks, equipment, deliveries and the like.

M. All interior temporary partitions and emergency egress barriers (if required) are to be installed on an after hours basis (weekends/school holidays).

N. 1. When use or storage of hazardous materials or equipment or unusual construction methods are necessary to perform its work, the Contractor shall obtain the Owner and the Construction Manager's consent for the use of such materials, equipment or unusual construction methods. In the event the Owner determines that the use of such hazardous material or equipment or unusual construction methods can be performed by the Contractor with alternative means, methods and/or techniques, the Contractor shall employ such alternate means of prosecuting its work at no additional cost to the Owner.

2. In the event the Owner allows the use or storage of such hazardous materials, equipment or unusual construction methods, the Contractor shall provide for the Owner's and the Construction Manager's use a full set of safety instructions relating to all such materials, equipment or methods. Additionally, when the Owner and/or the Construction Manager allows the use or storage of such hazardous materials, equipment and/or unusual construction methods, the Contractor shall exercise the highest degree of care and carry on such activities under supervision of properly qualified personnel.

3. Transportation, storage, and use of explosives shall be in strict accordance with all local, state and federal laws, ordinances, regulations, rules, codes, orders and policies of public authorities or governmental agencies. All safety precautions as set forth in the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, Inc. shall be observed.

4. The Contractor is responsible for its own storage and personnel trailers at the site. The Contractor will be required to supply man trailers and storage box trailers as required. All costs related to delivery, construction, protection, power, etc. for said trailers are the responsibility of the contractor utilizing the space. The Owner WILL NOT PROVIDE STORAGE SPACE. The placement of personnel and/or storage trailer will be strictly limited to pre-determined locations. The Contractor shall obtain the written approval of the placement of any trailer or storage box from the Construction Manager.

O. During construction, the General Contractor shall be responsible for maintaining a watertight structure. This shall include additions and existing buildings. The Contractor shall be responsible for temporary roofing, tarps and other protection at roofs, cavity walls, and any other openings. Should the Contractor fail to provide adequate protection, causing flooding, damage or other disturbance to the existing building, Contractor shall be responsible for all costs associated with clean up and repairs. Inasmuch as flooding and damage have safety implications to the general public, clean up and repairs may be made by the Owner without warning to the Contractor. Administration costs incurred by the Owner, Construction Manager and Architect as a result of inadequate protection will also be back charged to the Contractor. The Contractor, by entering into a contract with the Owner agrees to be liable for these costs.

P. When all or a portion of the Contractor's work is suspended for any reason, the Contractor shall securely fasten down all coverings and protect the work, as necessary, from injury by any cause.

Q. 1. The Contractor shall promptly remedy damage and loss to all property of the Owner, or adjacent to the Owner's property (other than damage or loss covered by insurance) 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, except damage or loss attributable to acts or omissions of the Owner, Construction Manager or Architect or anyone directly or indirectly employed by them, or by anyone for whose acts they may be liable, and not attributable to the fault or negligence of the Contractor.

2. Title to all completed or partially completed work at the Project site(s), and to all materials delivered to and stored at said Project site(s) which are intended to become a part of the completed work covered by the agreement between the Contractor and the Owner, shall be in the name of the Owner. Notwithstanding the foregoing, and prior to acceptance of the completed work by the Owner, the Contractor shall be liable for all loss of or damage to said completed work, partially completed work, materials furnished by the Contractor, and/or materials or equipment furnished by others, the custody of which has been given to the Contractor, arising from any cause other than those against which the Owner herein undertakes to carry insurance. In the event of loss or damage from cause other than those against which the Owner undertakes to carry insurance, the Contractor shall replace or repair the said work or materials at his own cost and expense, to the complete satisfaction of the Owner, the Construction Manager and the Architect.

R. The Contractor shall promptly report in writing to the Owner, the Architect and the Construction Manager all accidents arising out of or in connection with the work that causes death, person injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner, Construction Manager and the Architect.

S. 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.

T. Any and all fines or citations levied against the Owner, Architect, or Construction Manager due to the failure of the Contractor to comply with the rules, regulations or orders of any governing authority, shall be paid for by the Contractor. This shall include any interest or late charges which accrue due to the Contractor's failure to remit payment upon receipt of such levies, fines or citations.

U. To the maximum extent permitted by law, the Contractor shall indemnify, defend and hold harmless the Owner, Construction Manager, Architect and their respective officers, employees, agents, and members of the Owner's Board of Education from any and all claims, damages, losses, suits, obligations, fines, penalties, costs, charges and expenses which may be imposed upon or incurred by or asserted against any of them by reason of any act or omission of such Contractor or any Subcontractor or any person or firm directly or indirectly employed by such Contractor, with respect to violations of OSHA requirements, rules and/or regulations.

V. The Contractor acknowledges that the Labor Law of the State of New York, and regulations adopted thereunder, place upon both the Owner and Contractor certain duties and that liability for failure to comply therewith is imposed on both the Owner and Contractor regardless of their respective fault. The Contractor hereby agrees that, as between the Owner and the Contractor, and to the extent permitted by law, the Contractor is solely responsible for compliance with all such laws and regulations imposed for the protection of persons performing the work of the Contract between the Owner and the Contractor.

W. To the maximum extent permitted by law, the Contractor shall indemnify, defend and hold harmless the Owner, Architect, Construction Manager and their respective officers, employees, agents, and members of the Owner's Board of Education, of and from any and all liability for violation of the Labor Law of the State of New York and the regulations adopted thereunder and shall defend any claims or actions which may be brought against the Owner as the result thereof. In the event that the Contractor fails or refuses to defend any such claim or action, the Contractor shall be liable to the Owner for all costs incurred by the Owner, Architect or Construction Manager in defending such claim or action and all costs of the Owner, including attorney's fees, in recovering such defense costs from the Contractor.

X. To the maximum extent permitted by law, the Contractor and its Subcontractors shall indemnify, defend and hold harmless the Owner, Construction Manager, Architect and their respective officers, employees, agents, and members of the Owner's Board of Education from any and all claims, damages, losses, suits, obligations, fines, penalties, costs, charges and expenses which may be imposed upon or incurred by or asserted against any of them by reason of any act or omission of such Contractor or any Subcontractor or any person or firm directly or indirectly employed by such Contractor in connection with the Project, for the act and/or omissions of any Contractor or Subcontractor that resulted in an incident and/or accident causing death, personal injury and/or property damage.

ARTICLE 8
CHANGES IN THE WORK

A. Without invalidating the agreement between the Owner and the Contractor, and without notice to the Contractor's surety, the Owner may, at any time or from time to time, order additions, deletions or revisions in the Contractor's work. Such additions, deletions or revisions will be authorized by field order, change order, or construction change directive.

B. Field Orders are an interpretation of the Drawings and/or Specifications which order minor changes in the Contractor's work which will not result in an increase or decrease in the Contractor's total contract sum. From time to time, the Architect may issue field orders to the Contractor. The work included in such field order shall be performed by the Contractor at no additional cost to the Owner and shall not form the basis for a claim for an extension of the Contractor's time to complete its work. Hence, the Contractor shall perform the work included in field orders so as to cause no delay to its work and/or the work of other contractors engaged by the Owner in connection with the Project. All field orders shall be given to the Contractor and the Construction Manager by the Architect in writing.

C. 1. When the Owner or Architect (in association with the Construction Manager) request that the Contractor perform work which is not included in the Contract Documents and which will result in additional cost to the Owner, the Architect/Construction Manager shall issue a PCO Number and shall request that the Contractor submit its proposal for performing such additional work. The Contractor shall submit its proposal to the Construction Manager and Architect for review. The Contractor's proposal shall include a complete itemization of the costs associated with performing its work including labor and materials. All proposals for any work that a Contractor, its Subcontractor(s) or subcontractor(s) of Subcontractor(s) perform in connection with additional work shall be submitted using the following format and in no event shall the total for overhead and profit on any change order exceed fifteen percent (15%) of the cost of the additional work.

1.	Materials (Itemized Breakdown) including quantities and cost	
2.	Labor (Itemized Breakdown)	
3.	Subtotal (Add lines 1 and 2)	
4.	Credit for work not required due to additional or changes to the work reflected in the within change order (if any)	
5.	Overhead (10% x line 3)	
6.	Subtotal (Add lines 3 through 5)	
7.	Sub-Contract work (Include itemized breakdown. Sub-Contractor(s) overhead and profit allowed is 10%)	
8.	Subtotal (Add lines 6 and 7)	
9.	Profit (5% x line 8)	
10.	Subtotal (Add lines 8 and 9)	
11.	Rental Value of Equipment (Itemized Breakdown)	
12.	Actual additional charges for bonds	

13.	TOTAL CHANGE ORDER (Add lines 10, 11 and 12)	

2. a. All proposals submitted by the Contractor without the itemization indicated herein will be returned to the Contractor for re-submission by the Contractor. For any work performed by the Contractor's own forces, fifteen percent (15%) for overhead and profit will be allowed for labor and material related costs. Costs to which overhead is to be applied shall be limited to cost of labor and materials including the cost of delivery. Under no circumstances shall any change order proposal exceed fifteen percent (15%) of the cost for overhead and profit.

b. The Contractor shall not be entitled to recover overhead and profit on the rental value of equipment and machinery. "Equipment and machinery" shall not include (1) tools customarily used by the Contractor's trade, including but not limited to hand tools, and/or (2) equipment and machinery already on site and being utilized by the Contractor for the original scope of work.

c. The Contractor shall submit with its change order proposals actual invoices from its surety or broker reflecting actual additional costs associated with the procurement of bonds to cover the additional work, if any.

3. The Contractor's Subcontractor's proposal for any work it is to perform in connection with the additional work shall only include ten percent (10%) for the subcontractor's overhead and profit including sub-subcontracted work. The Contractor is entitled to five percent (5%) on work performed by its subcontractor in accordance with paragraph C(1) of this Article 8. Costs to which overhead is to be applied shall be limited to cost of labor and materials including the cost of delivery. Under no circumstances shall the Contractor or the Contractor's Subcontractor(s) be entitled to be reimbursed for overtime, except when specifically approved by the Owner in writing and not as an Extraordinary Measure as set forth in Article 13, and in such event the Contractor shall be paid for by the Owner on the basis of premium payment.

4. Notwithstanding the foregoing, work which is performed pursuant to an allowance included in the Contractor's base contract, the provisions of Article 9, paragraph B, concerning itemization of such work shall be controlling.

5. a. A change in the Contract Sum shall be accomplished only by a written Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Contractor's work, whether or not there is, in fact, any unjust enrichment to the work, shall be the basis of any claim as defined in Article 18 of these General Conditions to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents. **No amount shall be payable by the Owner to the Contractor for performance of additional work without a written and fully executed Change Order.**

b. Upon the Contractor's completion of the change order work, and prior to payment being made to the Contractor for such work, the Contractor shall provide the Owner with the following information:

(1) Certified payrolls itemizing the labor actually utilized in connection with the change order work.

(2) Copies of invoices from Subcontractors supplying work in connection with the change order work.

D. 1. When the Owner or Architect request that portions of the Contractor's work originally included in the Contract Documents be deleted and which will result in a reduction of the Contractor's original contract sum, the Architect shall request that the Contractor submit its proposal for deleting the scope of such work from its contract. The Contractor's proposal shall include a complete itemization of the costs associated with deducting such work including labor and materials and shall be submitted using the format set forth in Article 8, paragraph C(1) of these General Conditions of the Contract for Construction or the schedule of values, whichever is greater. The Contractor shall not be entitled to retain its overhead and/or profit for such work nor shall any of its Subcontractors which were to perform the work being deducted from the Contractor's scope of work. Additionally, the Contractor shall reflect the reduced cost of premiums on bonds which are to be supplied herein as a result of such change. 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/decrease with respect to that change.

2. The Owner may in its sole discretion deduct and/or reduce the scope of the Contractor's contract with or without any specific reasons therefor.

E. 1. In the event the Contractor and the Owner cannot agree on the sum by which its contract with the Owner is to be increased or reduced based upon changes to the scope of the work as described in this Article 8, the Architect shall issue a construction change directive reflecting the deduction and/or reduction of the scope of the Contractor's contract and the Contractor will (a) in the case of additional work to be performed by the Contractor, perform such additional work in an expeditious manner so as not to delay the work of this or other contractors working at the site, and (b) in the case of work to be deducted from the scope of the Contractor's work, refrain from taking any steps in connection with the work associated with the deduction and/or reduction of the scope of the Contractor's work. The construction change directive shall include (a) a description of the work being added or deducted from the Contractor's scope of work; (b) the amount the Owner has determined to be the cost associated with the additional work or deduction and/or reduction of the scope of the Contractor's contract until the Owner and the Contractor agree upon the increase or decrease in the Contractor's contract sum, or until a claim filed by the Contractor has been determined; (c) the extent to which the contract time will be adjusted as a result of the change in the scope of work. Any claims must be filed in accordance with the requirements set forth in Article 18 of these

General Conditions. Failure to timely file any claim in accordance with requirements set forth therein shall constitute a waiver of such claim.

2. In the event the Contractor and the Owner reach agreement on the amount by which the Contractor's contract sum is to be increased or decreased based upon changes to the scope of the Contractor's work as described in this Article 8, the Architect, Owner, Construction Manager and Contractor shall sign a change order reflecting such agreement. The change order shall include (a) the description of the change in the scope of the Contractor's work; (b) the amount of the adjustment to the Contractor's contract sum, if any; and (c) the length of time by which the time to complete the contract will be adjusted, if any. Agreement between the Owner and the Contractor in connection with any change order shall constitute a final settlement of all matters relating to the change in the Contractor's work as reflected in said change order, including but not limited to, all direct and indirect costs associated with such change and any and all adjustments to the Contractor's contract sum and the construction schedule. All such change orders for which the Owner and the Contractor have reached agreement shall be included as a separate line item in the Contractor's applications for payment as if originally part of the Contractor's agreement with the Owner.

F. Neither the Owner, the Construction Manager nor Architect may issue instructions to the Contractor to change the amount of the Contract, except by properly executed Change Orders. Instructions are issued by the Owner or the Construction Manager through the Architect, to the Contractor. The instructions that change the amount of the contract between the Owner and the Contractor shall not be carried out by the Contractor prior to a written order in the form of a Change Order, signed by the Owner, Architect, Construction Manager and Contractor, authorizing a change in the contract sum or an adjustment to the time for performance of the contract. No amount shall be payable by the Owner to the Contractor for performance of additional work without an executed Change Order.

ARTICLE 9
PAYMENTS

A. 1. Prior to commencing its work on the Project and within one (1) week of receipt of a Notice to Proceed, the Contractor shall submit to the Construction Manager and the Architect, a schedule of values which includes the amount of money it has allocated in its bid price for the following items of work which are applicable to the Contractor's work. Said schedule of values shall include each of the CSI division sections reflected in the specifications and applicable to the work for which the Contractor has been awarded a contract, together with the requirements for bonds/insurance (based upon actual invoice amount), general conditions, meeting attendance and meeting documentation (at least two (2) percent of the contract sum), shop drawing/product data/sample submissions (at least one (1) percent of contract sum), labor and materials on line items as applicable, temporary utilities and services, HVAC balance reports, coordination drawings, punchlist (at least one (1) percent of the contract sum), warranties/guarantees and close out of the project (at least three (3) percent of the contract sum), and allowance, where applicable.

2. Any schedule of values which fails to include sufficient detail, is unbalanced or exhibits "front loading" of the value of the Contractor's work will be rejected. Furthermore, if the schedule of values has been approved by the Construction Manager and the Architect and is subsequently used, but later is found by the Construction Manager or Architect to be improper for any reason, sufficient funds shall be withheld from the Contractors' future applications for payment to ensure an adequate reserve (exclusive of normal retainage) to complete the Contractor's work.

3. The schedule of values shall be drafted so as to reflect multiple construction sites, multiple locations within each site, additions versus renovations of work, and the like so as to satisfy any New York State Education Department requirements for the Project.

4. The Schedule of Values prepared by the Contractor must be approved by the Construction Manager and the Architect prior to the payment of any sums due the Contractor.

B. The Contractor shall include in its contract sum all allowances stated in the Contract Documents . However, the Contractor's costs for unloading and handling at the site, overhead, profit and other expenses contemplated for the stated allowance amounts shall be included in its contract sum and not in the allowances.

C. The Contractor shall submit its applications for payment to the Construction Manager and the Architect on a periodic basis. The forms to be used by the Contractor shall be AIA 702/CMa and 703/CMa approved by the Construction Manager, the Architect and the Owner for use in connection with the Contractor's work. The form shall be divided in substantially the same form as the Contractor's schedule of values and shall reflect in separate line items for the work:

1. Total value of the work listing labor and material separately;

2. Percentage of work completed at the time of submission of the application for payment;
3. Value of the work completed at the time of submission of the application for payment;
4. Percent of previous amount billed;
5. Previous amount billed;
6. Current percent completed;
7. Value of work completed to date;
8. Percent remaining to be completed by the Contractor; and
9. Value of work remaining to be completed by the Contractor.

D. 1. Payments to the Contractor shall be based upon materials and equipment delivered and suitably stored at the site and/or incorporated into the Contractor's work, together with the labor utilized by the Contractor in connection with its work. The Contractor may be paid for materials and/or equipment which has been delivered to the Owner's facilities but which, at the time of submission of its application for payment, has not yet been incorporated into the Contractor's work upon such conditions and requirements as the Owner, the Construction Manager and/or the Architect may advise the Contractor it must satisfy.

2. The Construction Manager and Architect shall review the application for payment submitted by the Contractor and shall advise the Contractor of any adjustments to be made thereto. The Construction Manager and/or the Architect may make such adjustments under the following circumstances:

a. the Contractor's failure to remedy defective work;

b. the filing of third party claims or reasonable evidence that there is a probability that such claims will be filed;

c. receipt by the Owner of a notice of withholding from the New York State Department of Labor or other administrative agencies having jurisdiction over the Project;

d. the Contractor's failure to make proper payments to its Subcontractors or material suppliers for labor, materials and/or equipment;

e. reasonable evidence that the Contractor will not complete its work for the unpaid balance of the remaining monies on its contract;

f. damages caused to the Owner, Construction Manager, the Architect or another contractor as a result of the Contractor's performance of its work;

g. reasonable evidence that the Contractor will not complete its work in accordance with its agreement with the Owner, and/or that the remaining

monies available on the Contractor's contract will not be sufficient to cover actual or liquidated damages for the anticipated delay;

h. the Contractor's failure to carry out its work in accordance with the Contract Documents;

i. the Contractor's failure to notify the Architect of errors or inconsistencies between and among the Contract Documents;

j. the Contractor's and/or its Subcontractors' failure to comply with the requirements for maintaining record drawings;

k. the Architect's and/or the Construction Manager's discovery or observation of work which has been previously paid for by the Owner which is defective and/or incomplete;

l. such other acts and/or omissions by the Contractor in connection with the performance of its work; and

m. the amount requested exceeds the percent completion of the Contractor's work on the site.

3. After any such adjustments are made to the Contractor's application for payment, the Contractor shall submit four (4) copies of the final draft of its application for payment to the Construction Manager and Architect, which shall be accompanied by the following documentation:

a. A current Contractor's lien waiver and duly executed and acknowledged sworn statement showing all Subcontractors and material suppliers with whom the Contractor has entered into subcontracts, the amount of each such subcontract, the amount requested for any Subcontractor and material suppliers in the requested progress payment and the amount to be paid to the Contractor from such progress payment, together with similar sworn statements from all such Subcontractors and material suppliers;

b. Duly executed waivers of public improvement liens from all Subcontractors and material suppliers and lower tiered Subcontractors or material suppliers establishing payment or satisfaction of payment of all amounts requested by the Contractor on behalf of such entities or persons in any previous Application for Payment; and AIA Form G706 or G706A.

c. Certified payroll for employees of the Contractor and employees of Subcontractors performing work on the Project.

d. Copies of invoices submitted to the Contractor by its Subcontractors and/or material suppliers.

e. Such other information which the Owner, Construction Manager and/or the Architect request the Contractor furnish in connection with its application for payment, including but not limited to, contractor change order log, contractor submittal log and as built drawings to date.

4. Upon submission of its application for payment, the Contractor represents that it is entitled to payment in the amount for which it seeks payment.

5. In addition to the right to make adjustments to the amount the Contractor claims is due it (as set forth in subparagraph 2 of this paragraph D, the Owner may withhold payment from the Contractor and the Architect and/or Construction Manager may withhold certification for payment, if the Contractor fails to supply any of the documents set forth in subparagraph 3 of this paragraph D.

6. Until Substantial Completion, the Owner shall pay ninety-five (95%) percent of the amount due the Contractor for each progress payments subject to any additional withholding required for liens or authorized by law or the Contract Documents.

7. The Owner shall make payment to the Contractor within thirty days of receipt of the Contractor's requisition of payment unless such requisition of payment is not in accordance with the terms of the Contract Documents.

8. Upon receipt of payment by the Owner, the Contractor shall promptly make payment to each of its Subcontractors and/or material suppliers for which it has received payment from the Owner. This provision does not obligate the Architect, the Construction Manager and/or the Owner to ensure payment to the Contractor's Subcontractors and/or material suppliers.

9. a. In the event a Subcontractor and/or material supplier files with the Owner a public improvement lien, the Owner shall withhold payment on previously certified applications for payment which have not yet been paid or subsequent applications for payment submitted by the Contractor an amount equal to 150% of the amount set forth in such public improvement lien. This provision is in addition to and does not supersede the indemnity provisions set forth in Article 12 of these General Conditions.

b. The Owner may release any payment withheld due to the filing of a public improvement lien after the lien is discharged by the Contractor or released by the lienor. If the lien is discharged by posting a lien bond which is: (1) issued by a surety acceptable to the Owner, (2) in form and substance satisfactory to the Owner, and (3) in an amount not less the 110% of such lien claim. The cost of the premiums for any such bond posted shall be borne solely by the Contractor. By posting a lien bond , however, the Contractor shall not be relieved of its

obligations pursuant to these General Conditions, including but not limited to the indemnity provisions set forth in Article 12 of these General Conditions.

E. 1. The Contractor shall not be entitled to payment for materials and/or equipment stored off the site unless previously approved in writing by the Owner, Architect, and/or the Construction Manager and upon the Contractor meeting any and all conditions which the Owner, the Architect and/or Construction Manager may impose in connection with such materials and/or equipment, including but not limited to insurance for such materials and cost of storage and transportation associated with such materials and/or equipment. No payment will be made for "commodity type" stored materials such as block, studs, sheetrock, roofing, insulation, piping, fittings, conduit work, etc.

2. In connection with materials and/or equipment stored off the Project site(s), the Contractor must submit with its application for payment the following information:

a. Type of material must be specifically identified by the Contractor;

b. The Contractor must furnish an invoice from its supplier showing the total value of material and/or equipment being stored off site and must provide the bill of lading for such material and/or equipment;

c. The Contractor must provide a Certificate of Insurance in a form approved by the Owner for the full value of the item plus 10%.

d. The Contractor must execute a security agreement, together with an executed UCC-1 form;

e. The materials must be stored in a bonded warehouse; and

f. The Contractor must furnish a bill of sale for stored material and/or equipment.

Contractor still has liability for all materials whether paid or not until installed.

3. Any and all materials and/or equipment for which the Contractor has been paid shall be titled in the Owner upon installation by the Contractor and shall be stored in a bonded facility. For payment to be made to the Contractor, the Contractor must provide the Owner with a waiver of lien and general release from its supplier in connection with its provisions of such materials and/or equipment. Notwithstanding payment by the Owner, any and all warranties and/or guarantees required by the Contract Documents shall not begin to run until the Contractor has completed all of its work.

4. Prior to payment by the Owner, the Contractor may be required to provide the Architect and the Construction Manager with an opportunity to visually inspect the materials

and/or equipment for the purpose of determining that such materials are in fact in storage, are the materials specified for the Contractor's work and for any other purpose which the Owner, Construction Manager and/or Architect deem necessary for payment to be made to the Contractor.

F. If the Owner is entitled to reimbursement or payment from the Contractor under or pursuant to the Contract Documents, including but not limited to these General Conditions of the Contract for Construction, such payment shall be made promptly upon demand by the Owner. Notwithstanding anything contained herein to the contrary, if the Contractor fails to promptly make any payment due the Owner, or the Owner incurs any costs and expenses to cure any default of the Contractor or to correct defective work, the Owner shall have an absolute right to offset such amount against the Contract Sum and may, in the Owner's sole discretion, elect either to: (1) deduct an amount equal to that which the Owner is entitled from any payment then or thereafter due the Contractor from the Owner, or (2) issue a written notice to the Contractor reducing the Contractor's contract sum by an amount equal to that which the Owner is entitled.

G. The Contractor may not assign any monies due or to become due to it pursuant to its agreement with the Owner without the Owner's written consent. Any such assignment shall be in a form acceptable to the Owner. If the Contractor attempts to make such an assignment without such consent from the Owner, the Contractor shall nevertheless remain legally responsible for all obligations under its agreement with the Owner.

H. Progress payments and all other payments shall be made in accordance with Section 106-b of the General Municipal Law.

I. At the same time the Contractor submits its insurance certificate to the Owner and the Construction Manager, it shall also submit to the Construction Manager the labor rates of each category of labor which it and/or its Subcontractors shall employ (either directly or indirectly).

This information shall be itemized using the format shown below:

Contractor's Name	
Contractor's Address	
Contractor's Office Phone	
Contractor's Fax Number	
Contractor's Email Address	

Labor Rate Breakdown					
Worker's Title		**Journeyman**	**1.5 Rate**	**Foreman**	**1.5 Rate**
Base Hourly Rate					
Payroll Tax & Insurance:	**$ Per Hr.**				
FICA					
Federal Unemployment					
State					
Workers Compensation					
Disability					
Other (Explanation Required)					
Subtotal					
Benefits:	**$ Per Hr**				
Vacation					
Health & Welfare					
Pension					
Annuity					
401K Fund					
Other (Explanation Required)					
Other Explanation Required)					
Subtotal					
Hourly Labor Rate					

ARTICLE 10
INSURANCE REQUIREMENTS

A. The Contractor shall effectuate the naming of the School District, the Architect and the Construction Manager and their respective officers, directors, employees, consultants and agents and the naming of the School District's Board of Education and volunteers as Additional Insureds on the Contractor's insurance policies, except for Workers' Compensation and N.Y. State Disability insurance.

B. The policy(ies) naming the School District, the Architect and the Construction Manager and their respective officers, directors, employees, consultants and agents and the naming of the School District's Board of Education and volunteers as Additional Insureds shall:

1. Be an insurance policy from an A.M. Best A- rated or better insurer, **licensed and admitted** to conduct business in New York State. A New York licensed and admitted insurer is **required**.

2. State that the Contractor's coverage shall be primary and non-contributory coverage for the School District, the Architect and the Construction Manager and their respective officers, directors, employees, consultants and agents and the School District's Board of Education and volunteers including a waiver of subrogation in favor of the School District, the Architect and the Construction Manager for all coverages including Workers Compensation.

3. Additional insured status for General Liability coverage shall be provided by standard or other endorsements that extend coverage to the School District, the Architect and the Construction Manager for on-going operations (CG 20 38 or equivalent) and products and completed operations (CG 20 37 or equivalent). The decision to accept an endorsement rests solely with the School District. A completed copy of the endorsements must be attached to the Certificate of Insurance to include General Liability, Auto Liability and Umbrella/Excess coverages.

C. 1. The certificate of insurance must describe **all services** provided by the Contractor (e.g., roofing, carpentry or plumbing) that are covered by the liability policies.

2. At the School District's request, the Contractor shall provide a copy of the declaration page of the liability and umbrella/excess policies with a list of endorsements and forms. If requested, the Contractor will provide a copy of the policy endorsements and forms.

3. There will be no coverage restrictions and/or exclusions involving New York State Labor Law statutes or gravity related injuries.

4. No policies containing escape clauses or exclusions contrary to the Owner's interests will be accepted.

5. A fully completed New York Construction Certificate of Liability Insurance Addendum (ACORD 855 2014/15) must be included with the certificates of insurance. For any "Yes" answers on Items G through L on this Form– additional details must be provided in writing. Policy exclusions may not be accepted.

D. In the event that any of the insurance coverage to be provided by the Contractor contains a deductible or self-insured retention, or the insurance provided by the Owner contains a deductible or self-insured retention, to the maximum extent permitted by law, the Contractor shall indemnify and hold the Owner, the Architect and the Construction Manager harmless from the payment of such deductible or self-insured retention, which deductible and self-insured retention shall in all circumstances remain the sole obligation and expense of the Contractor for claims arising from the work, acts or omissions of the Contractor and the Contractor's owners, officers, directors, employees, Subcontractors, suppliers and others directly or indirectly retained to perform a portion of the Contractor's work or provide materials or equipment for all or part of the Contractor's work.

E. The Contractor, at its sole cost and expense, shall have and maintain at a minimum the following types and amounts of insurance coverage at least until Contractor's final payment application has been certified by the Architect or for such longer time required by these General Conditions or other provisions of the Contract Documents:

1. **Commercial General Liability Insurance**
   $1,000,000 per Occurrence/$2,000,000 Aggregate
   $2,000,000 Products and Completed Operations
   $1,000,000 Personal and Advertising Injury
   $100,000 Fire Damage
   $10,000 Medical Expense
   The general aggregate shall apply on a per-project basis.

2. **Owners Contractors Protective (OCP) Insurance**
   If the agreement between the Contractor and the Owner is for a sum less than or equal to $1,000,000 and the Contractor's work is on 1 story (10 feet) only, then the OCP insurance shall have limits of $1,000,000 per occurrence, $2,000,000 aggregate with the School District as the Named Insured.

   If the agreement between the Contractor and the Owner is for a sum greater than $1,000,000 or the Contractor's work is over 1 story (10 feet), then the OCP insurance shall have limits of $2,000,000 per occurrence, $4,000,000 aggregate with the School District as the Named Insured.

   The OCP Policy must be with a NYS licensed and admitted carrier. The School District (not the Contractor) will be the Named Insured on OCP Policies. There will be no Additional

Insureds on any OCP Policies.

3. **Automobile Liability**
$1,000,000 combined single limit for owned, hired, borrowed and non-owned motor vehicles.

4. **Workers' Compensation and NYS Disability Insurance**
Statutory Workers' Compensation (C-105.2 or U-26.3) and NYS Disability Insurance (DB-120.1) for all employees. Proof of coverage must be on the approved specific form, as required by the New York State Workers' Compensation Board. ACORD certificates are not acceptable. A person seeking an exemption must file a CE-200 Form with the state. The form can be completed and submitted directly to the WC Board online.

5. **Builder's Risk**
Will be purchased and maintained by the Owner to include the interests of the Owner, Contractor, Subcontractors and sub-Subcontractors jointly. The limit will reflect the total completed value (all material and labor costs) and provide coverage for fire, lightning, explosion, extended coverage, vandalism, malicious mischief, windstorm, hail and/or flood. Coverage will remain in effect until the Owner is the only entity that has an insurable interest in the property.

6. **Umbrella/Excess Insurance**
$5,000,000 each Occurrence and Aggregate when there is no work at elevation (which up to 1 story or 10 feet) and the agreement between the Contractor and the School District is for a sum less than or equal to $1,000,000.

$10,000,000 each Occurrence and Aggregate for when there is work at elevation (which is greater than 1 story or 10 feet) and the agreement between the Contractor and the School District is for a sum greater than $1,000,000.

Umbrella/Excess coverage shall be on a follow-form basis or provide broader coverage over the General Liability and Auto Liability coverages.

7. **Testing Company Errors and Omission Insurance**
$1,000,000 per occurrence/$2,000,000 aggregate for the testing and other professional acts of the Contractor performed under the Contract with the School District/BOCES.

8. **Additional Insurance when the Project requires the removal of Asbestos, Lead and/or Hazardous Materials**
Asbestos/Lead Abatement/Pollution Liability Insurance
$2,000,000 per occurrence/$2,000,000 aggregate, including products and completed operations. Such insurance shall include coverage for the Contractor's operations 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. If a retroactive date is used, it shall pre-date the inception of the agreement between the Contractor and the School District. If the Contractor is using motor vehicles for transporting hazardous materials, the Contractor shall maintain pollution liability broadened coverage (ISO Endorsement CA 9948 or CA 01 12), as well as proof of MCS 90. Coverage shall fulfill all requirements of this Article 10 and shall extend for a period of three (3) years following acceptance by the School District of the Certificate of Completion.

F. The Contractor acknowledges that failure to obtain such insurance on behalf of the School District constitutes a material breach of contract and subjects the Contractor to liability for damages, indemnification and all other legal remedies available to the School District. The Contractor is to provide the School District, through the Construction Manager, with a certificate of insurance, evidencing the above requirements have been met, prior to the commencement of work. The failure of the School District to object to the contents of the certificate or the absence of same shall not be deemed a waiver of any rights held by the School District.

G. **The Contractor shall require all Subcontractors to obtain and maintain the same types of insurance with the same limits of coverage and same additional insureds as set forth in paragraph E of this Article 10 and the Subcontractors policies must comply with all the requirements set forth in this Article 10.** Contractor shall confirm each Subcontractors compliance with the insurance requirements of this Article 10 and collect proof of each Subcontractor's insurance prior to the start of any work by the Subcontractor. In the event a Subcontractor fails to obtain the required insurance and a claim is made or suffered, the Contractor shall indemnify, defend, and hold harmless the Owner, the Architect and the Construction Manager and their respective officers, directors, employees, consultants and agents and the School District's Board of Education and volunteers from any and all claims for which the required insurance would have provided coverage. **This indemnity obligation is in addition to any other indemnity obligation(s) provided in these General Conditions and the Contract Documents.**

H. In the event the Contractor fails to obtain the required certificates of insurance from any of its Subcontractors and a claim is made or suffered, the Contractor shall indemnify, defend, and hold harmless the School District, the Architect and the Construction Manager and their respective officers, directors, employees, consultants and agents and the School District's Board of Education volunteers from any and all claims for which the required insurance would have provided coverage. **This indemnity obligation is in addition to any other indemnity obligation provided in the Contract Documents.**

I. 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. Any policy of insurance secured covering such items that the Contractor or Subcontractors leased or hired 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.

J. The Owner in good faith may adjust and settle a loss with the Contractor's insurance carrier(s).

K. Review, acknowledgment and/or acceptance of the Contractor's Certificate(s) of Insurance by the Owner, Construction Manager or the Architect shall not relieve or decrease the obligations or liability of the Contractor hereunder.

L. If the terms of policies expire, or the lives of the insurance companies terminate, before the Contract is completed or during the period of completed operations coverage, and the Contractor fails to maintain continuance of such insurance, the Owner is entitled to provide protection for itself, to pay premiums, and to charge the cost to the Contractor.

ARTICLE 11
REQUIRED BONDS FOR THE PROJECT

A. Within ten (10) days of the award of the bid, the Contractor shall furnish a Performance Bond and Labor and Material Payment Bond meeting all statutory requirements of the State of New York and all requirements of the Contract Documents, including but not limited to these General Conditions.

B. All Surety companies are subject to the approval of the Owner and may be rejected by the Owner without cause.

C. Except as otherwise required by statute, the form and substance of such bonds shall be satisfactory to the Owner in the Owner's sole judgment.

D. Bonds shall be executed by a responsible surety admitted and licensed to do business in New York with an A.M. Best Rating of "A-" or better. Such bonds shall remain in effect for a period not less than two (2) years following final completion of the work by the Contractor.

E. Bonds shall further be executed by a surety that is currently listed on the U.S. Treasury Department Circular 570 entitled "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies," as amended.

F. The Performance Bond and the Labor and Material Payment Bond shall each be in an amount equal to 100% of the Contract Sum. The value of each bond shall be adjusted during the Project construction period to reflect changes in the Contract Sum.

G. Every Bond must display the Surety's Bond Number.

H. Each bond must be accompanied by an original Power of Attorney, giving the names of Attorneys-in-fact, and the extent of their bonding capacity.

I. Each bond must incorporate the following modifications into the text of the bond or through a rider:

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, omission, change, extension of time, or other modification of the Contract Documents, or a forbearance on the part of either the Owner or the Contractor to the other, shall not release the Surety of its obligations hereunder and notice to the Surety of such matters is hereby waived.

2. 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 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 the Owner.

3. 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 termination by the Owner of the Contractor's contract or within two years after final completion by the Contractor. In the event the Contractor files for bankruptcy, the commencement of the two year period shall not start to run until the bankruptcy proceeding is finalized or the Owner obtains relief from an automatic stay, whichever is later.

J. The Contractor shall deliver the required bonds to the Owner prior to beginning construction activity at any Project site(s), but no later than 10 days after issue date of Notice of Award of Contract. Said bonds shall be in the form set forth in the Project Manual. No work shall be performed by the Contractor until such bonds have been reviewed and approved by the Owner.

K. The Owner may, in the Owner's sole discretion and without prior notice to the Contractor, inform surety of the progress of the Contractor's work and obtain consents as necessary to protect the Owner's rights, interest, privileges and benefits under and pursuant to any bond issued in connection with the Contractor's work.

L. If the surety on any Bond furnished by Contractor is declared a bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of this Article, the Contractor shall within ten (10) days thereafter substitute another Performance and Payment Bond and surety, both of which must be acceptable to the Owner.

ARTICLE 12
INDEMNIFICATION

A. To the fullest extent permitted by law, the Contractor and its Subcontractors shall indemnify and hold harmless (1) the Owner and its Board of Education, consultants, employees, officers and agents, (2) the Architect and its consultants, employees, officers and agents, and (3) the Construction Manager and its consultants, employees, officers and agents, from and against any and all claims, damages, losses, suits, obligations, fines, penalties, costs, charges and expenses, including but not limited to attorneys' fees, which may be imposed upon or incurred by or asserted against any of them by reason of any act or omission of such Contractor or any of its Subcontractors or any person or firm directly or indirectly employed by such Contractor or Subcontractor in connection with the work of the Project.

B. To the fullest extent permitted by law, the Contractor and its subcontractors shall indemnify and hold harmless (1) the Owner and its Board of Education, consultants, employees, officers and agents, (2) the Architect and its consultants, employees, officers and agents, and (3) the Construction Manager and its consultants, employees, officers and agents, from and against claims, damages, losses and expenses including but not limited to attorneys' fees, arising out of or resulting from performance of its work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including loss of use resulting therefrom, but only to the extent caused in whole or in part by intentional misconduct, reckless or negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Paragraph B. The Contractor's indemnity obligations under this Paragraph B shall, but not by way of limitation, specifically include all claims and judgments which may be made against the Owner, the Architect, the Construction Manager and the consultants, agents and employees of any of them under any applicable statute, rule or regulation including the New York Statute, Occupational Safety and Hazardous Act, and the Federal Occupational Safety and Hazardous Act. In claims against any person or entity indemnified under this Paragraph B by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Paragraph B shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

C. To the fullest extent permitted by law, the Contractor and its Subcontractors shall indemnify and hold harmless (1) the Owner and its Board of Education, consultants, employees, officers and agents, (2) the Architect and its consultants, employees, officers and agents, and (3) the Construction Manager and its consultants, employees, officers and agents, against any fines, penalties, judgments, or damages, including reasonable attorney's fees, imposed on or incurred by the parties indemnified hereunder which are incurred as a result of the Contractor's failure

to give the notices required by Article 6(T) of these General Conditions of the Contract for Construction.

D. To the fullest extent permitted by law, the Contractor and its Subcontractors shall indemnify and hold harmless (1) the Owner and its Board of Education, consultants, employees, officers and agents, (2) the Architect and its consultants, employees, officers and agents, and (3) the Construction Manager and its consultants, employees, officers and agents, against any actions, lawsuits or proceedings or claims of liens brought against each or any of them as a result of liens filed against the Contractor's project funds, including all the costs and expenses arising from said liens, including but not limited to attorneys' fees incurred by each or any of them.

E. To the fullest extent permitted by law, the Contractor and its Subcontractors shall indemnify and hold harmless (1) the Owner and its Board of Education, consultants, employees, officers and agents, (2) the Architect and its consultants, employees, officers and agents, and (3) the Construction Manager and its consultants, employees, officers and agents from any and all liability for violation of any laws and regulations applicable to the Contractor's work and shall defend any claims or actions which may be brought against the Owner, the Architect and/or the Construction Manager as the result thereof. In the event that the Contractor shall fail or refuse to defend any such action, the Contractor shall be liable to the Owner, the Architect and/or the Construction Manager for all costs that each of them incurs to defend such claim or action and all costs that each of them incurs, including attorney's fees, to recover such defense costs from the Contractor.

F. To the fullest extent permitted by law, the Contractor and its Subcontractors shall indemnify and hold harmless (1) the Owner and its Board of Education, consultants, employees, officers and agents, (2) the Architect and its consultants, employees, officers and agents, and (3) the Construction Manager and its consultants, employees, officers and agents, from any and all liability for claims made by third parties, including Subcontractors, in connection with the Contractor's agreement with the Owner and shall defend any claims or actions which may be brought against the Owner, the Architect and/or the Construction Manager as the result thereof. In the event that the Contractor shall fail or refuse to defend any such action, the Contractor shall be liable to the Owner, the Architect and/or the Construction Manager for all costs of each of them incurs to defend such claim or action and all costs of each of them incurs, including attorney's fees, to recover such defense costs from the Contractor.

G. To the fullest extent permitted by law, the Contractor will defend, indemnify and hold harmless (1) the Owner, its consultants, employees, officers, members of the Board of Education and agents; (2) the Architect and its consultants, employees, officers and agents; and (3) the Construction Manager and its consultants, employees, officers and agents, from and against any and all claims, damages, losses, suits, obligations, fines, penalties, costs, charges, and expenses which may be imposed upon or incurred by or asserted against any of them by reason of any act or omission of such Contractor or any subcontractor or any person or firm directly or indirectly employed by such Contractor, with respect to violations of OSHA requirements, rules, and/or regulations.

H. The indemnification obligations set forth herein shall become effective upon the Owner, Architect or Construction Manager's receipt of a claim for which the Contractor is required to provide indemnification to the Owner, Architect or Construction Manager. In the event the Owner, Architect or Construction Manager is required to bring an action to enforce the indemnification obligation, the Contractor shall be liable to the Owner, Architect, and/or Construction Manager for all costs associated with said action including attorneys' fees.

ARTICLE 13
TIME FOR COMPLETION OF WORK

A. The date of commencement of the Contractor's work shall be as indicated in the agreement between the Contractor and the Owner. The date shall not be postponed or extended by the failure to act of the Contractor or of persons or entities for whom the Contractor is responsible to act. Time limits stated in the agreement between the Owner and the Contractor are of the essence of the Contract. By executing the agreement with the Owner, the Contractor confirms that the Contract Time is a reasonable period for performing the work.

B. The Contractor shall not commence work on the site until two certified copies of all insurance policies and bonds required by Article 10 and Article 11 of these General Conditions of the Contract for Construction are provided to the Owner and accepted by the Owner. The date of commencement and/or completion of the Contractor's work shall not be changed by the effective date of such insurance. The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on any Project site(s) or elsewhere prior to the acceptance of the insurance and bonds required by Article 10 and Article 11 of these General Conditions.

C. The Contractor shall proceed expeditiously with adequate forces and shall achieve substantial completion of its contract in accordance with the schedule set forth in the Contract Documents. The Contractor shall cooperate with the Owner, Architect, Construction Manager, and other Contractors on the Project, making every reasonable effort to reduce the contract time.

D. 1. In the event the Owner determines that the performance of the Contractor's work has not progressed or reached the level of completion required for it to complete its work on time, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (1) working additional shifts or overtime, (2) supplying additional manpower, equipment, and facilities and other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the Contractor progresses its work in compliance with the stage of completion required for it to timely complete its work in accordance with the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the milestone dates and/or construction schedule included in the Contract Documents.

2. The Contractor shall not be entitled to an adjustment in its contract sum in connection with Extraordinary Measures ordered by the Owner under or pursuant to this Paragraph D.

3. The Owner may exercise the rights furnished the Owner under or pursuant to this Paragraph D as frequently as the Owner deems necessary to ensure that the Contractor's performance of its work will comply with any Milestone Date or completion date set forth in the Contract Documents.

4. The Owner reserves the right to withhold payment from the Contractor until such time as the Contractor submits a daily schedule showing its work to be again on schedule with the milestone dates and/or Construction Schedule included in the Contract Documents, without additional cost to the Owner.

E. The Contractor shall achieve substantial completion of its work in accordance with the schedule for the work set forth in the Contract Documents. Milestone Dates are dates critical to the Owner's operations that establish when a part of the work is to commence or be complete. All Milestone Dates are of the essence and shall have the same meaning as Substantial Completion for the purpose of Liquidated Damages in this Article 13.

F. Substantial completion shall be achieved by the Contractor when the Contractor has completed ninety eight (98%) of its work and the work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy and utilize the Work for its intended use without material interference or interruption as a result of punch list work to be performed thereafter. Work remaining to be completed after substantial completion shall be limited to items which can ordinarily be completed within the period between the payment at the time of substantial completion and final payment.

G. 1. This Project is to be physically completed in accordance with the time limits set forth in the Contract Documents. Inasmuch as the damage and loss to the Owner which will result from failure of the Contractor to achieve completion of the Work within the required time limits will be difficult to ascertain, liquidated damages will be assessed in the amount of $1,000.00 for each and every calendar day after such time allowed for completion.

2. Contractor realizes that time is of the essence on with regard to its agreement with the Owner and the completion date and milestone date for each work item in the Contract Documents, a Milestone Date reflected on the project schedule, or the date of substantial completion of the Contractor's work shall be no later than the date indicated therein. In the event the Contractor fails to complete any work or substantially complete the work under the Contract Documents by said schedule date, the sum per calendar day for each date not met, as delineated above, will be subtracted from the payment due the Contractor (or, if the amount due Contractor as payment is insufficient, any deficiency shall be paid by the Contractor to the Owner), except for days where the Contractor has applied for and been granted an extension of time in accordance with the provisions of this Article 13.

3. The said sum per calendar day 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 by reason of delay) the Owner may incur as a result of Contractor's breach of Contract. In the event that substantial completion of its work is not achieved in accordance with the Project schedule, inspections will be performed once each week unless the Owner or the Architect determines, at their sole discretion, that any of the additional inspections are not needed. In addition to the Liquidated Damages, all costs incurred by the Owner, including fees for the Construction Manager and the Architect, and the cost of additional inspections, at the rate of One Thousand Dollars ($1,000) per inspection, will be subtracted from payment due the Contractor. If the amount due the Contractor for payment is insufficient, any deficiency shall be paid by the Contractor to the Owner.

H. 1. Except as otherwise permitted by Article 13(H)(4), an extension of time granted in accordance with this Article 13(H) shall be the sole remedy of the Contractor for any delay in the completion of its work. Within five (5) calendar days from the occurrence of same, the Contractor must apply in writing to the Owner, its Architect or Construction Manager for an extension of time to complete its work where it has been delayed as a result of: unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including acts of God, acts of a public enemy, acts of the federal or state government in either their sovereign or contractual capacities, fires, floods, epidemics, quarantine restrictions, priority or allocation orders duly issued by the federal government; freight embargoes; changes in the work to be performed by the Contractor. The Contractor may not apply for an extension of time for delays in acquisitions of materials other than by reason of freight embargoes. All other delays of the Project, including but not limited to, Architect review and/or approval of shop drawings and/or submittals, requests for information, clarifications, samples, and change orders; Owner schedule; Architect certification of payment; payment by Owner of Contractor's Application for Payment; coordination amongst Contractors; unavailability of materials and/or equipment; surveying/testing; closeout, etc. are deemed to be foreseeable and, therefore shall not form the basis for a claim for an extension of time by the Contractor.

2. All claims for additional time shall be supported by documentation which demonstrates to the Architect and Construction Manager's satisfaction that the critical path of the work has been significantly altered by the delays to the activities in question, and that the schedule cannot be maintained by re-ordering other activities within the Project at no cost. Upon receipt of the Contractor's request for an extension of time, the Owner, with the assistance of the Architect and Construction Manager, will ascertain the facts and extent of the delay, and may, in its sole discretion, extend the time for completion of the Contractor's work when in its judgment such an extension is justified. The Owner's determination will be final and binding in any litigation commenced by the Contractor against the Owner which arises out of the Owner's denial of an extension of time to the Contractor. Any approval of an extension of the Contractor's time to complete its work shall be memorialized by written change order, signed by the Owner, Contractor, Architect and Construction Manager. Where the Owner determines that the Contractor will be granted an extension of time, such extension shall be computed in accordance with the following:

For each day of delay in the completion of its work, the Contractor shall be allowed one day of additional time to complete its work. The Contractor shall not be entitled to receive a separate extension of time for each one of several causes of delay operating concurrently; only the actual period of delay as determined by the Owner, with the assistance of the Construction Manager and the Architect may be allowed.

3. The Owner reserves the right to delay the commencement of Work or to otherwise modify the construction schedule set forth in the Contract Documents in order to comply with applicable State, Federal and/or local laws, regulations, or orders related to the COVID-19 pandemic or any other pandemic or emergency circumstance. Contractor's remedies for any schedule modifications or delays caused directly or indirectly by the COVID-19 pandemic or any other pandemic or emergency circumstance shall be an extension of time only, as further delineated in Article 13 (H)(4), below.

4. Notwithstanding anything to the contrary in the Contract Documents, an extension in the contract time, to the extent permitted under subparagraph H of this Article 13, shall be the sole remedy of the Contractor for any (1) delay in the commencement, prosecution, or completion of the work; (2) hindrance or obstruction in the performance of the work; (3) loss of productivity or acceleration; or (4) other similar claims (collective referred to herein as "delay(s)"), unless a delay is caused by the Owner's 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 three (3) days' written notice of such interference. In no event shall the Contractor be entitled to any compensation or recovery of any damages in connection with any Delay, including, but not limited to, consequential damages, lost opportunity costs, impact damages, or other similar remuneration. The Owner's exercise of any of its rights or remedies under the Contract Documents (including, but not limited to, ordering changes in the work, or directing suspension, rescheduling or correction of the work), regardless of the extent or frequency of the Owner's exercise of such rights or remedies, shall not be construed as active interference with the Contractor's performance of the work.

ARTICLE 14
DEFICIENT AND INCOMPLETE WORK

A. The Owner, through its Architect or Construction Manager, will have the authority to reject work performed by the Contractor which does not conform to the requirements of the Contract Documents.

B. The Owner, through its Architect or Construction Manager, shall have the authority to require additional inspection or testing of the Contractor's work whether or not such work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment

suppliers, their agents or employees, or other persons performing portions of the work to have performed additional inspection or testing of the work.

C. 1. If a portion of the Contractor's work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, including but not limited to the Drawings and/or Specifications, upon request by the Architect or the Construction Manager, the Contractor shall uncover such work for the Architect's or any governmental authority's observation and be replaced at the Contractor's sole expense without change in the Contract Time or Contract Sum.

2. If a portion of the Contractor's work has been covered, which the Architect or any governmental authority has not specifically requested to observe prior to its being covered, the Architect or any governmental authority may request to see such work and it shall be uncovered by the Contractor. If such work is in accordance with the Contract Documents, including but not limited to the Drawings and/or Specifications, costs of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such work is not in accordance with the Contract Documents, the Contractor, at its sole cost and expense, shall uncover and replace such work.

D. The Contractor shall promptly correct work rejected by the Owner, through its Architect or Construction Manager, for failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear all costs of correcting such rejected work, including but not limited to the cost of said additional testing and/or inspection, the cost of the Construction Manager's and Architect's services incurred in conjunction with such additional testing, and any cost, loss or damage to the Owner resulting from such actions. If prior to the date of Substantial Completion, the Contractor, a Sub-contractor or anyone for whom either is responsible uses or damages any portion of the work or premises, including, without limitation, mechanical, electrical, plumbing and other building systems, machinery, equipment or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner.

E. If the Contractor (1) fails to correct work which is not in accordance with the requirements of the Contract Documents, or (2) fails to carry out its work in accordance with the requirements of the Contract Documents, or (3) fails or refuses to provide a sufficient amount of properly supervised and coordinated labor, materials, or equipment so as to be able to complete the work within the contract time, or (4) fails to remove and discharge (within ten (10) days) any lien filed upon Owner's property and/or Project funds by anyone claiming by, through, or under the Contractor, or (5) disregards the instructions of the Architect, Owner or Construction Manager, the Construction Manager, on behalf of the Owner may order the Contractor to stop its 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. This right shall be in addition to, and not in restriction of, other rights the Owner may have pursuant to these General Conditions or at law.

F. 1. If the Contractor defaults or neglects to carry out its work in accordance with the Contract Documents and fails within a three (3) day period after receipt of written notice from the Construction Manager 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 cost of correcting such deficiencies, including compensation for the Architect, the Construction Manager and the Owner and such other consultants whose participation is deemed necessary by the Architect, for additional services and expenses made necessary by such default, neglect or failure. Such action by the Construction Manager, including the amounts to be charged to the Contractor as a result of such action are subject to the prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

2. Where the Contractor's default and/or neglect to carry out its work in accordance with the Contract Documents threatens the health, safety and/or welfare of the occupants of the School District's facilities and/or threatens the structural integrity and/or preservation of the School District's facilities, the Owner may proceed to carry out the Contractor's work upon as much notice to the Contractor of its intention to do so as is practicable and reasonable under the circumstances.

G. If the Owner prefers to accept work which is not in accordance with the terms and conditions of the Contract Documents, the Owner may, in its discretion, accept such work and reduce the Contractor's contract sum accordingly.

ARTICLE 15
FINAL COMPLETION AND CLOSEOUT OF THE PROJECT

A. 1. When advised by the Construction Manager that the Contractor's work is near substantial completion, the Architect shall visit the site to determine whether the Contractor's work is substantially complete. If the Architect's observations of the Contractor's work discloses any item which has not been performed in accordance with the requirements of the Contract Documents and/or which has not been completed to the point indicated in Article 13 paragraph F of these General Conditions, the Contractor shall complete or correct such items upon receipt of notification from the Architect and/or Construction Manager that a deficiency exists. The Architect shall not issue a certificate of substantial completion for the work of the Contractor until the work has been completed in accordance with Article 13(F) of these General Conditions. Upon completion of the work to correct the deficiencies identified by the Architect and/or Construction Manager, the Contractor shall advise the Architect of the need for an inspection of the work. If the Architect is required to inspect the Contractor's work more than twice, the Contractor shall be liable to the Owner for the cost of the services performed by the Architect and Construction Manager as a result of any additional inspections.

2. Upon determining that the Contractor's work has progressed to the point of Substantial Completion, the Architect shall prepare a punch list of the Contractor's work which shall include only minor items of work remaining to be performed by the Contractor to bring its work into compliance with the requirements of the Contract Documents. The Contractor shall proceed promptly to complete and correct items on the punch list issued by the Architect and shall complete said items within thirty (30) days of its receipt of the punch list from the Architect. At the time of substantial completion, the Owner shall retain 200 percent of the value of the punch list items from the Contractor's remaining contract sum. The value of said remaining work shall be determined by the Architect in consultation with the Construction Manager. Upon completion of the work reflected in the final punch list, the Owner shall release the monies withheld pursuant to this paragraph to the Contractor.

3. The Architect's failure to include an item of deficiency on the punch list issued to the Contractor shall not relieve the Contractor of its responsibility to perform its work in accordance with the Contract Documents.

B. 1. If within two (2) years after the date of Substantial Completion of the Contractor's work or designated portion thereof, or after the date for commencement of warranties established pursuant to these General Conditions, 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 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. This period of two (2) years shall be extended with respect to portions of the Contractor's work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of such work. The obligation set forth hereunder shall survive acceptance by the Owner of the Contractor's work and/or termination of the Contractor's agreement with the Owner. The Owner shall give such notice within a reasonable period of time after discovery of the condition.

2. The Contractor shall, within a reasonable time after receipt of written notice thereof, but in no event more than seventy-two (72) hours after receipt of such notice, commence to correct, repair, and make good any defects in its work.

3. The obligations of the Contractor pursuant to this paragraph shall cover any repairs to or replacement of work affected by the defective work.

4. In the case of any work performed in correcting defects pursuant to this paragraph, the guarantee periods specified herein shall begin anew from the date of acceptance by the Owner of such work.

C. Upon receipt of written notice from the Construction Manager that the Contractor's work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Contractor's work acceptable and fully performed pursuant to the terms and conditions of the Contract Documents and after receipt of the closeout documentation required by the Contract

Documents, the Architect will certify to the Owner that the Contractor is entitled to final payment on the Project.

D. 1. Prior to receipt of final payment from the Owner, the Contractor shall provide the Architect and/or the Construction Manager with the close out documentation required by the Contract Documents.

2. The Contractor shall schedule a close out meeting with the Architect and the Construction Manager for the purpose of delivering the close out documents required pursuant to the Contract Documents.

E. If the Contractor's work is not accepted by the Owner after final inspection and additional time is required to complete items identified during the final inspection, the date starting the warranty periods described in the Contract Documents shall be set by the Architect at his discretion.

F. If the Architect is required to perform more than one final inspection because the Contractor's work fails to comply with the requirements of the Contract Documents, the amount of compensation paid to the Architect and the Construction Manager by the Owner for additional services shall be deducted from the final payment to the Contractor.

G. Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those claims previously made in writing in accordance with the terms of Article 18 hereof and identified by that payee as unsettled at the time of final Application for Payment.

H. Contractor shall submit all documentation identified in this Article and other sections of the Contract Documents within ninety (90) days from the date of Substantial Completion. If the documentation has not been submitted, the Owner will obtain same through whatever means necessary. The Contractor shall solely be responsible for all expenses incurred by the Owner in securing such documentation.

ARTICLE 16
RELEVANT STATUTORY PROVISIONS

A. The Contractor shall at all times observe and comply with all Federal, State and local (Village, Town, City, County, etc.) Laws, Ordinances, Regulations, rules, codes, orders and policies as well as the policies, regulations and protocols of the Owner, in any manner affecting the work and all orders and decrees that exist at present and those which may be enacted later, by bodies or tribunals having jurisdiction or authority over the work, and the Contractor shall indemnify and save harmless the Owner and its Board of Education, officers, agents, consultants (including but not limited to the Construction Manager and the Architect) and employees against any claim or liability arising from, or based on, a violation of any such law,

ordinances, regulation, policy, protocol, order or decree, whether by Contractor or by Contractor's officers, directors, Subcontractors, suppliers, employees or agents.

B. The Contractor and each of its Subcontractors shall comply with Prevailing Wage Rates as issued by the State of New York Department of Labor for the location and duration of this Project and shall comply with all requirements governing its payments to its employees as set forth in Labor Law, section 220 et seq of the New York State Labor Law, as amended.

C. The Contractor and each of its Subcontractors shall post a notice at the beginning of the performance of every public work contract on each work site that includes the telephone number and addresses for the Department of Labor and a statement informing laborers, workers or mechanics of their right to contact the Department of Labor if he/she is not receiving the proper prevailing rate of wages and/or supplements for his/her particular job classification.

D. The Contractor specifically agrees, as required by Labor Law, Sections 220 and 220-d, as amended, that:

1. No laborer, workman or mechanic in the employ of the Contractor, subcontractor or other person doing or contracting to do the whole or any part of the work contemplated by the Contractor's agreement with the Owner, shall be permitted or required to work more than eight hours in any one calendar day or more than five days in any one week, except in the emergencies set forth in the Labor Law.

2. The wages paid for a legal day's work shall not be less than the prevailing rate of wages as defined by law.

3. The minimum hourly rate of wages to be paid shall not be less than that stated in the document accessible by the link included in the Project Manual, and any re-determination of the prevailing rate of wages after a contract is awarded to the Contractor by the School District shall be deemed to be incorporated herein by reference as of the effective date of re-determination and shall form a part of the Contract Documents. The Labor Law provides that the agreement between the Contractor and the Owner may be forfeited and no sum paid for any work done thereunder on a second conviction for willfully paying less than:

a. The stipulated wage scale as provided in Labor Law, Section 220, Subdivision 3, as amended; or

b. The stipulated minimum hourly wage scale as provided in Labor Law, Section 220-d, as amended.

E. The Contractor acknowledges that its work is governed by the provisions of Section 101 of the General Municipal Law of the State of New York.

F. The Contractor specifically agrees, as required by the provisions of the Labor Law of New

York, Section 220-E, as amended that:

1. In the hiring of employees for the performance of the agreement between the Owner and the Contractor or any Subcontractor thereunder, no Contractor, Subcontractor, nor any person acting on behalf of such Contractor or Subcontractor shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates.

2. No Contractor, Subcontractor, nor any person on their behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under the agreement between the Owner and the Contractor on account of race, color, creed, sex, disability or national origin.

3. There may be deducted from the amount payable to the Contractor a penalty of fifty dollars for each person for each calendar day during which such person was discriminated against or intimidated in violation of the provisions of this Article 16(F).

4. The agreement between the Owner and the Contractor may be canceled or terminated by the Owner and all monies due or to become due hereunder may be forfeited for a second or any subsequent violation of the terms or conditions of this section of the Contract.

The aforesaid provisions of this Article 16(F) shall be limited to operations performed within the territorial limits of the State of New York.

G. The Contractor shall conform to the guidelines spelled out in the County's Affirmative Action Program, if any.

H. The Contractor shall comply with all of the provisions of the Immigration Reform and Control Act of 1986 and regulations promulgated pursuant thereto and shall require its Subcontractors to comply with same. To maximum extent permitted by law and in addition to any other indemnification obligation set forth in the Contract Documents, the Contractor shall and does hereby agree to fully indemnify, protect, defend, and hold harmless the Owner, Owner's agents, officers, representatives, members of the Board of Education, and employees from and against any penalties, fees, costs, liabilities, suits, claims, or expenses of any kind or nature, including reasonable attorney's fees, arising out of or resulting from any violation or alleged violation of the provisions of said laws in connection with the work performed hereunder.

I. The agreement between the Owner and the Contractor shall be void if the Contractor fails to install, maintain, and effectively operate appliances and methods for the elimination of harmful dust when a harmful dust shall have been identified in accordance with Section 222-a of the Labor Law of the State of New York.

J. The Contractor shall insure that absolutely no asbestos containing material or any other hazardous material (e.g., lead) is used in conjunction with the performance of its work. The Contractor bears the sole responsibility to provide assurances that no asbestos containing material is built into the construction, or that any equipment used in the construction contains any asbestos containing material. If asbestos containing material is found, at any time during or after the construction is completed, it shall be the responsibility of the Contractor who installed said material to remove it and replace it with new non-asbestos containing material, as per federal, state and local mandates.

K. Large and small asbestos abatement projects as defined by 12 N.Y.C.R.R. 56 shall not be performed while the building is occupied. As referenced in this section, the term "building" shall mean a wing or major section of a building that can be completely isolated from the rest of the building with sealed non-combustible construction. The isolated portion of the building must contain exits that do not pass through the occupied portion, and ventilation systems must be physically separated and sealed at the isolation barrier. Exterior work such as roofing, flashing, siding or soffit work may be performed on occupied buildings provided proper variances are in place as required, and complete isolation of ventilation systems and windows is provided. Work must be scheduled so that classes are not disrupted by noise or visual distraction.

L. Surfaces that will be disturbed by reconstruction must have a determination made as to the presence of lead. Projects which disturb surfaces that contain lead shall have in the specifications a plan prepared by a certified Lead Risk Assessor or Supervisor which details provisions for occupant protection, worksite preparation, work methods, cleaning and clearance testing which are in general accordance with the HUD Guidelines.

M. No smoking is allowed anywhere on school property per New York State and County law. Violators are subject to a $1,000 fine and/or banishment from the property.

N. Applicable codes and standards for material furnished and work installed shall include all federal. state and local laws, ordinances, regulations, rules, codes orders and requirements of governmental agencies having jurisdiction, and applicable requirements of the following codes and standards, including but not limited to:

1. New York State Uniform Fire Prevention and Building Code, and amendments thereto.
2. New York State Energy Conservation Construction Code.
3. New York State Education Department Manual of Planning Standards.
4. New York State Department of Transportation, Office of Engineering, Standard Specification, Construction and Materials, latest edition.
5. Life Safety Code - NFPA.

O. Unless otherwise stated in the Contract Documents when referenced, wherever in the Specifications reference is made to ANSI or ASTM Standards, Federal Specifications, Consumer Product Standards, or similar recognized standards, the latest edition of the respective

publishing agency in effect at the date of "Bid Issuance" shall be accepted as establishing the technical requirements for which compliance is required.

P. The Owner shall be entitled to request of Contractor or its successor in interest adequate assurance of future performance in accordance with the terms and conditions of its agreement in the event (1) an order for relief is entered on behalf of the Contractor pursuant to Title 11 of the United States Code, (2) any other similar order is entered under any other debtor relief laws, (3) the Contractor makes a general assignment for the benefit of its creditors, (4) a receiver is appointed for the benefit of its creditors, or (5) a receiver is appointed on account of its insolvency. Failure to comply with such request within ten (10) days of delivery of the request shall entitle the Owner to terminate its agreement with the Contractor in accordance with Article 17 hereof. In all events, pending receipt of adequate assurance of performance and actual performance in accordance therewith, the Owner shall be entitled to proceed with the Contractor's work with its own forces or with other contractors on a time and material or other appropriate basis, the cost of which will be back charged against the Contractor.

Q. The Contractor shall maintain policies of employment as follows:

1. The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of age, creed, sexual orientation, gender identity or expression, military status, disability, predisposing genetic characteristics, familial status, marital status, status as a victim of domestic violence, race, religion, color, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their age, race, creed, color, national origin, sexual orientation, gender identity or expression, military status, sex, reproductive health decisions, disability, predisposing genetic characteristics, religion, familial status, status as a victim of domestic violence or marital status. Such action will include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

2. The Contractor and the Contractor's Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, sexual orientation, gender identity or expression, military status, sex, reproductive health decisions, disability, predisposing genetic characteristics, religion, familial status, status as a victim of domestic violence or marital status.

ARTICLE 17
TERMINATION OR SUSPENSION

A. 1. The Owner may terminate its agreement with the Contractor in the event the Contractor:

a. refuses or fails to supply sufficient skilled workers or suitable materials or equipment to complete the work in a diligent, efficient, timely, workmanlike, skillful, or careful manner;

b. refuses or fails to correct deficient work performed by it;

c. fails to make prompt payments to subcontractors for labor, materials, and/or equipment in accordance with the respective agreements between the Contractor and the Subcontractors;

d. breaches any of its obligations pursuant to or violates any applicable federal, State or local laws, ordinances, rules, regulations, or requirements of any lawful order;

e. disregards any federal, state, and local laws, ordinances, regulations, rules, codes, orders, and policies of public authorities or governmental agencies having jurisdiction over the Project and/or the Contractor's work;

f. disregards the instructions of the Architect, Construction Manager or the Owner (when such instructions are based on the requirements of the Contract Documents);

g. to the extent permitted by state and federal debtor and creditor laws and regulations, is adjudged a bankrupt or insolvent, or makes a general assignment for the benefit of Contractor's creditors, or a trustee or receiver is appointed for Contractor or for any of its property, or files a petition to take advantage of any debtor's act or to reorganize under bankruptcy or similar laws;

h. breaches any warranty made by the Contractor under or pursuant to the Contract Documents;

i. fails to furnish the Owner with assurances satisfactory to the Owner evidencing the Contractor's ability to complete the work in compliance with all the requirements of the Contract Documents;

j. fails after commencement of the work to proceed continuously with the construction and completion of the work for more than ten (10) days, except as permitted under the Contract Documents.

k. fails to keep the Project free from strikes, work stoppages, slowdowns, lockouts or other disruptive activity;

l. breaches any of the policies, rules or regulations of the Owner; or

m. otherwise does not fully comply with the Contract Documents.

2. When any of the above reasons exists, the Owner may without prejudice to any other rights or remedies of the Owner, terminate employment of the Contractor upon three (3) days written notice and may, subject to any prior rights of the surety:

a. take possession of the Project site(s) and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

b. take possession of materials for the Project that are stored off site by the Contractor;

c. take assignments of the Contractor's Subcontractors in accordance with these General Conditions; and/or

d. finish the work by whatever reasonable method the Owner may deem expedient.

3. When the Owner terminates its agreement with the Contractor for one of the reasons stated in Subparagraph 1 of this Article 17.A., the Contractor shall not be entitled to receive further payment until the completion of the Contractor's work. If the Owner's costs to complete the Contractor's work, including the expenses incurred by the Owner in connection with the services of the Architect, the Construction Manager and/or other consultants, exceed the contract balance remaining on the Contractor's contract, the Contractor shall be liable to the Owner for such excess costs. This provision shall survive termination of the Contractor's agreement with the Owner.

B. 1. In addition to the Owner's right to carry out the work of the Contractor pursuant to the Contract Documents, the Owner may at any time, at will and without cause, terminate any part of the Contractor's work or all of the Contractor's remaining work for any reason whatsoever by giving three (3) days' written notice to Contractor, specifying the portion of the Contractor's work to be terminated and the effective date of termination.

2. Upon receipt of a notice of termination for convenience, the Contractor shall immediately, in accordance with instructions from the Owner, proceed with performance of the following duties regardless of delay in determining or adjusting amounts due under this Paragraph:

a. cease operation as specified in the notice;

b. place no further orders and enter into no further subcontracts for materials, labor, services or facilities except as necessary to complete continued portions of the Contract;

c. terminate all subcontracts and orders to the extent they relate to the work terminated;

d. proceed to complete the performance of the remaining work on its contract which has not been so terminated; and

e. take actions that may be necessary, or that the Owner may direct, for the protection and preservation of the terminated work.

3. The Contractor shall continue to prosecute that portion of its work which has not been terminated by the Owner pursuant to this Article 17. If the Contractor's work is terminated for the Owner's convenience, the Owner shall not be liable to the Contractor by reason of such termination except that the Contractor shall be entitled to payment for the work it has properly executed in accordance with the Contract Documents prior to the effective date of termination and for costs directly related to work thereafter performed by Contractor in terminating such work, provided such work is authorized in advance by the Owner, through the Construction Manager and Architect. No payment shall be made by Owner, for the work terminated by the Owner.

4. In case of a termination pursuant to this paragraph B, the Owner will issue a Construction Change Directive or authorize a Change Order, making any required adjustment to the Date of Substantial Completion and/or the sum of contract monies remaining to be paid to the Contractor. The Owner shall be credited for (1) payments previously made to the Contractor for the terminated portion of the work, (2) claims which the Owner has against the Contractor under the Contract and (3) the value of the work (e.g. labor, materials, supplies, equipment, overhead and profit or other items) that has been terminated that are part of the Contract Sum.

5. For the remaining portions of the Contractor's work which have not been terminated pursuant to this paragraph B, the terms and conditions of the Contract Documents shall remain in full force and effect.

6. Upon termination of the Contractor's work or a portion of the Contractor's work pursuant to this paragraph B, the Contractor shall recover as its sole remedy, payment for work which it has properly performed in connection with the terminated portion of the work prior to the effective date of termination and for items properly and timely fabricated off the Project site, delivered and stored in accordance with the Owner's instructions. The Contractor hereby waives and forfeits all other claims for payment and damages, including, without limitation, overhead and profit related to work terminated by the Owner pursuant to this paragraph B.

C. 1. In addition to Owner's right to suspend, delay, or interrupt Contractor from proceeding with any portion of its work pursuant to the terms and conditions of the Contract Documents, the Owner may at any time, at will and without cause suspend, delay, or interrupt any part of the Contractor's work or all work for any reason whatsoever for such period of time as the Owner may determine by giving three (3) days' prior written notice to Contractor, specifying that portion of the Contractor's work which is to be suspended, delayed, or interrupted, and the effective date of such suspension, delay, or interruption, as the case may be.

2. The Contractor shall continue to prosecute that portion of its work which has not been suspended, delayed, or interrupted, and shall properly protect and secure the portion of its work so suspended, delayed or interrupted.

3. The Owner shall incur no liability to Contractor by reason of such suspension, delay, or interruption except that Contractor may request an extension of its time to complete its work in accordance with Article 13 hereof.

D. The Contractor agrees and acknowledges that payments for the work 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 aforesaid obligations or bonds are no longer available for payment for the work, the Contractor expressly agrees that it shall be solely entitled to payment for work accomplished until a notice of suspension or cancellation is served upon it. The Contractor expressly waives any and all rights to institute an action, claim, 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 agreement with the Owner pursuant to this paragraph D.

ARTICLE 18
CLAIMS AND DISPUTES

A. Definition. A "Claim" is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of terms of the Contract Documents, payment of money, extension of time or other relief with respect to the terms of the agreement between the Owner and the Contractor. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the agreement between them.

B. Time Limits on Claims. Claims by the Contractor must be made within thirty (30) days after occurrence of the event giving rise to such Claim, or within thirty (30) days after the Contractor first recognizes the condition giving rise to the Claim, whichever is earlier. Claims by the Contractor must be made by written notice. An additional Claim made after the initial Claim has been decided by the Owner will not be considered unless submitted in a timely manner. Failure of the Contractor to give timely notice of claim shall constitute waiver of the claim. Claims must be made by written notice to the Construction Manager, Architect and Owner. The responsibility to substantiate Claims shall rest with the Contractor.

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

D. Claims for Concealed or Unknown Conditions. If conditions are encountered at the Project site(s) which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, which 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, then notice by the Contractor shall be given to the Owner and Architect promptly before conditions are disturbed and in no event later than five (5) days after first observance of the conditions; and, (3) in the case of a condition at the Project site(s) which involves a hazardous or toxic substance, as those terms are defined by OSHA or AHERA, notice to the Owner, the Construction Manager and the Architect shall be given immediately upon discovery of such hazardous or toxic substance. The Architect, and/or Construction Manager will promptly investigate such conditions and, if 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 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 Documents is justified, the Architect shall so notify the Contractor in writing, stating the reasons.

E. Claims for Additional Cost. If the Contractor wishes to make Claim for an increase in the Contract Sum as a result of a Change in the work pursuant to Article 8 of these General Conditions, written notice as provided in this Article 18 shall be given before proceeding to execute the work. Except as otherwise provided in Article 13, the sole remedy for claims based on delays in the performance of the Contractor's work is an extension time as permitted in Article 13of these General Conditions.

F. Claims for Additional Time. If the Contractor wishes to make a Claim for an increase in the Contract Time, the Contractor shall comply with the requirements set forth in Article 13 of these General Conditions.

G. Nothing contained in the Contract Documents shall relieve a Contractor from compliance with any statutory and/or regulatory requirements, including, but not limited to those contained in Education Law Section 3813 and in Section 155.5 of the REgulatoinso f the New York Commissioner of Education (8 NYCRR 155.5).

ARTICLE 19
MISCELLANEOUS PROVISIONS

A. The agreement between the Owner and the Contractor shall be governed by the law of the place where the Project is located, without regard to the conflicts of law's provisions thereof; venue to be in the County in which the Project is located.

B. Historical lack of enforcement of any law, local or otherwise, shall not constitute a waiver of Contractor's responsibility for compliance with such law in a manner consistent with its agreement with the Owner unless and until the Contractor has received written consent for the waiver of such compliance from the Owner and the Agency responsible for the enforcement of such law.

C. All notices to be given hereunder shall be in writing and may be given, served, or made by the parties or their attorneys or representatives (1) by depositing the same for first class mail delivery in the United States mail addressed to the authorized representative of the party to be notified; (2) by depositing the same in the United States mail addressed to the authorized representative of the party to be notified, postpaid and registered or certified with return receipt requested; (3) by depositing the same for overnight delivery (prepaid by or billed to the party giving notice) with the United States Postal Service or other nationally recognized overnight delivery service addressed to the authorized representative of the party to be notified; or (4) by delivering the same in person to the said authorized representative of such party. Notice deposited in the mail by certified or registered mail or by first class mail in accordance with the provisions hereof shall be effective from and after the fourth (4th) day next following the date postmarked on the envelope containing such notice, or when actually received, whichever is earlier. Notice sent by overnight delivery in accordance with the provisions hereof shall be effective from and after the second business day following the date submitted to the overnight delivery service or when actually received, whichever is earlier. All notices to be given to the parties hereto shall be sent to or made at the addresses set forth in the agreement between the Owner and Contractor. By giving the other parties at least seven (7) days' written notice thereof, the parties hereto shall have the right to change their respective addresses and specify as their respective addresses for the purposes hereof any other address in the United States of America.

D. Except as expressly provided in the Contract Documents, 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, or in equity or by other agreement, and such rights and remedies shall survive acceptance of the Contractor's work and/or any other termination of the Contractor's agreement with the Owner.

E. No action or failure to act by the Owner, Architect, Construction Manager 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.

F. The headings denoting the separately numbered Articles of these General Conditions are specifically set forth for reference purposes only and are not in any way to be deemed explanatory of or limiting of the contents of any paragraph or subparagraph. Furthermore, said headings are not to be deemed part of this Agreement for purposes of interpretation, litigation or as defining or limiting the rights or obligations of the parties.

G. In case any provision of Contract Documents should be held to be contrary to, or invalid, under the law of any country, state or other jurisdiction, such illegality or invalidity, shall not affect in any way any other provisions hereof, all of which shall continue, nevertheless, in full force and effect in any country, state or jurisdiction in which such provision is legal and valid. With respect to the provision of the Contract Documents determined to be contrary to law or invalid, the provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contractor's agreement with the Owner.

H. The rights stated in these General Conditions and the Contract Documents which form the agreement between the Owner and the Contractor are cumulative and not in limitation of any rights of the Owner at law or in equity.

I. The Owner shall not be responsible for damages or for loss of anticipated profits on work not performed on account of any termination of the Contractor by the Owner or by virtue of the Owner's exercise of its right to take over the Contractor's work pursuant to the Contract Documents.

J. The Owner shall not be liable to the Contractor for punitive damages on account of any termination of the Contractor or any other alleged breach of the agreement between it and the Contractor and the Contractor hereby expressly waives its right to claim such damages against the Owner.

K. The Contractor hereby expressly waives any rights it may have in law or in equity to lost bonding capacity as a result of any of the actions of the Owner, the Architect or the Construction Manager taken in connection with the Contractor's work on the Project.

L. Upon determination by legal means (e.g. court action, etc.) that termination of Contractor pursuant to Article 17.A.1 was wrongful, such termination will be deemed converted to a termination for convenience pursuant to Article 17.B.1 and Contractor's remedy for such termination shall be limited to the recovery of the payments permitted for termination for convenience as set forth in Article 17.B.1.

M. 1. The Owner may occupy or use any completed or partially completed portion of the Contractor's work at any stage when such occupancy is authorized by public authorities having jurisdiction over the Project.

2. Partial occupancy or use of a portion or portions of the work shall not constitute

acceptance of the Contractor's work, nor does it waive the Owner's right to liquidated damages. Further such occupancy alone shall not determine when substantial completion has been reached.

3. Immediately prior to such partial occupancy or use, the Owner, 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 Contractor's work, and in order to prepare a complete punchlist of omissions of materials, faulty workmanship, or any items to be repaired, removed or replaced.

N. The Contractor agrees not to assign, transfer, convey or sublet or otherwise dispose of its agreement with the Owner or the Contractor's right, title or interest therein or his power to execute such agreement, to any other person, firm or corporation without the previous consent in writing of the Owner.

O. This Contract may not be changed orally, but only by an agreement in writing signed by the Owner and Contractor. Any waiver of any term, condition or provision of this Contract will not constitute a waiver of any other term condition or provision, nor will a waiver of any breach of any term, condition or provision constitute a waiver of any subsequent or succeeding breach.

P. Notwithstanding anything to the contrary contained in the Contract Documents, the Owner may withhold any payment due the Contractor if and for so long as the Contractor fails to perform any of its obligations or otherwise is in default under any of the Contract Documents provided, however, that any such hold back shall be limited to an amount sufficient in the reasonable opinion of the Owner to cure any such default or failure of performance by the Contractor.

Q. The method of binding dispute resolution between the Contractor and the Owner shall be litigation in a court of competent jurisdiction in the County of Westchester in the State of New York, where the Project is located.

R. By signing the Agreement Between Owner and Contractor, each person and each person signing on behalf of any other party certifies, and in the case of a joint bid or partnership each party thereto certifies as to its/his/her own organization, under penalty of perjury, that to the best of its/his/her knowledge and belief that each person is not on the list created pursuant New York State Finance Law §165-a(3)(b).

S. THE CONTRACTOR HEREBY CONFIRMS THAT, TO THE EXTENT REQUIRED BY LAW, IT HAS IMPLEMENTED A WRITTEN ANTI-SEXUAL HARASSMENT POLICY THAT MEETS OR EXCEEDS THE REQUIREMENTS OF NEW YORK LABOR LAW SECTION 201-G AND THAT ANNUAL TRAINING REGARDING THIS POLICY IS AND WILL BE PROVIDED TO ALL OF ITS EMPLOYEES CONSISTENT WITH LAW.

T. The Owner is a tax exempt organization and will take title to materials used in the Project in order to permit tax exemption.

1. Upon request, the Owner will furnish documentation of the Owner's Tax Exemption status to the Contractor for use in purchasing tangible personal property required for the Project.

2. This exemption shall not apply to machinery, equipment, tools, and other items purchased, leased, rented, or otherwise acquired for the Contractor's use even though the machinery, equipment, tools or other items are used either in part or entirely on the work. This exemption shall apply only to materials fully incorporated into the work of the Contract as accepted and approved by the Architect.

3. The Contractor shall, upon request by the Owner, furnish a bill of sale or other instrument indicating the quantities and types of materials purchased directly by the Contractor or Subcontractor for incorporation into the work. Upon delivery of the materials to the site, the Contractor shall mark or otherwise identify the materials to be incorporated into the work. This exemption shall apply only to materials so identified and accepted.

END OF GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

IN ACCORDANCE WITH ARTICLE 8, SECTION 220 (3-a) OF THE NEW YORK STATE LABOR LAW, THE FOLLOWING LINK REPRESENTS THE MOST CURRENT PREVAILING WAGE RATE SCHEDULES AT THE TIME OF BIDDING, ISSUED BY THE NEW YORK STATE DEPARTMENT OF LABOR SPECIFICALLY REQUESTED FOR THIS PROJECT:

PRC# 2026002325

https://apps.labor.ny.gov/wpp/publicViewProject.do?method=showIt&id=1604476

CONTRACTOR IS TO OBTAIN THE PREVAILING WAGE RATES GENERATED FOR THIS PROJECT AT THE NEW YORK STATE DEPARTMENT OF LABOR WEBSITE.

- ASSEMBLY BILL NUMBER 1839
- NOTICES REGARDING WAGE RATE UPDATES
- WAGE RATE SCHEDULE
- LIST OF EMPLOYERS INELIGIBLE TO BID ON OR BE AWARDED PUBLIC WORK

Port Chester Rye Union Free School District
Board of Education
11 Bowman Avenue
Rye Brook, New York 10573

U.S. Department of Labor
Wage and Hour Division

PAYROLL

(For Contractor's Optional Use; See Instructions at www.dol.gov/whd/forms/wh347instr.htm)

Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number.

U.S. Wage and Hour Division

Rev. Dec. 2008

NAME OF CONTRACTOR ☐ OR SUBCONTRACTOR ☐	ADDRESS	OMB No.: 1235-0008 Expires: 02/28/2018
PAYROLL NO. / FOR WEEK ENDING	PROJECT AND LOCATION	PROJECT OR CONTRACT NO.

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER) OF WORKER	(2) NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	OT. OR ST.	(4) DAY AND DATE — HOURS WORKED EACH DAY	(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS: FICA	WITH-HOLDING TAX			OTHER	TOTAL DEDUCTIONS	(9) NET WAGES PAID FOR WEEK
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While completion of Form WH-347 is optional, it is mandatory for covered contractors and subcontractors performing work on Federally financed or assisted construction contracts to respond to the information collection contained in 29 C.F.R. §§ 3.3, 5.5(a). The Copeland Act (40 U.S.C. § 3145) contractors and subcontractors performing work on Federally financed or assisted construction contracts to "furnish weekly a statement with respect to the wages paid each employee during the preceding week." U.S. Department of Labor (DOL) regulations at 29 C.F.R. § 5.5(a)(3)(ii) require contractors to submit weekly a copy of all payrolls to the Federal agency contracting for or financing the construction project, accompanied by a signed "Statement of Compliance" indicating that the payrolls are correct and complete and that each laborer or mechanic has been paid not less than the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information to determine that employees have received legally required wages and fringe benefits.

Public Burden Statement

We estimate that it will take an average of 55 minutes to complete this collection, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. If you have any comments regarding these estimates or any other aspect of this collection, including suggestions for reducing this burden, send them to the Administrator, Wage and Hour Division, U.S. Department of Labor, Room S3502, 200 Constitution Avenue, N.W. Washington, D.C. 20210

(over)

Date _____

I, _____ _____
(Name of Signatory Party) (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by

on the
(Contractor or Subcontractor)

_____;
(Building or Work)

that during the payroll period commencing on the _____ day of _____, _____, and ending the _____ day of _____, _____, all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said

_____ from the full
(Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

_____

_____

_____

_____

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

☐ – in addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ – Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.

DRAFT

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)

« »« »
« »

BOND AMOUNT: $ « »

PROJECT:
(Name, location or address, and Project number, if any)

«PWA»
« »
« »

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.

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

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

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User Notes:

Signed and sealed this « » day of « » , « »

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

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AIA® Document A312™ – 2010

Performance Bond

CONTRACTOR:
(Name, legal status and address)
« »« »
« »

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

OWNER:
(Name, legal status and address)
« »« »
« »

CONSTRUCTION CONTRACT
Date: « »
Amount: $ « »
Description:
(Name and location)
«PWA»
« »

BOND
Date:
(Not earlier than Construction Contract Date)
« »
Amount: $ « »
Modifications to this Bond: « » None « » See Section 16

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:	« »« »	Name and Title:	« »« »

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**
« »
« »
« »

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)
« »
« »
« »
« »
« »
« »

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

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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

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User Notes: (1798589260)

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

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§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:	« »« »	Name and Title:	« »« »
Address:	« »	Address:	« »

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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)
«PWA»
« »

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:)

« »
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« »
« »
« »
« »

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

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User Notes:
(1783972170)

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- **.1** have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- **.2** have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

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User Notes: (1783972170)

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

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User Notes:
(1783972170)

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:	« »« »	Name and Title:	« »« »
Address:	« »	Address:	« »

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DRAFT

AIA® Document G702™ - 1992

Application and Certificate for Payment

TO OWNER:

PROJECT: PWA

APPLICATION NO: 001

Distribution to:
OWNER:
ARCHITECT:
CONTRACTOR:
FIELD:
:

PERIOD TO:

CONTRACT FOR: General Construction

CONTRACT DATE:

PROJECT NOS: / /

FROM CONTRACTOR:

VIA ARCHITECT:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM	$0.00
2. NET CHANGE BY CHANGE ORDERS	$0.00
3. CONTRACT SUM TO DATE (Line 1 ± 2)	$0.00
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)	$0.00
5. RETAINAGE:	
a. 0 % of Completed Work (Column D + E on G703: $0.00)=	$0.00
b. 0 % of Stored Material (Column F on G703: $0.00)=	$0.00
Total Retainage (Lines 5a + 5b or Total in Column I of G703)	$0.00
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)	$0.00
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate)	$0.00
8. CURRENT PAYMENT DUE	$0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)	$0.00

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$0.00	$0.00
Total approved this Month	$0.00	$0.00
TOTALS	$0.00	$0.00
NET CHANGES by Change Order		$0.00

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:
County of:
Subscribed and sworn to before me this day of
Notary Public:
My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED $0.00

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

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AIA® Document G703™ – 1992

Continuation Sheet

AIA Document, G702™–1992, Application and Certification for Payment, or G736™–2009, Project Application and Project Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.
In tabulations below, amounts are in US dollars.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:	001
APPLICATION DATE:	
PERIOD TO:	
ARCHITECT'S PROJECT NO:	

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED FROM PREVIOUS APPLICATION (D + E)	WORK COMPLETED THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D + E + F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
	GRAND TOTAL	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00%**	**0.00**	**0.00**

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AIA® Document G704™ – 2000

Certificate of Substantial Completion

PROJECT:
(Name and address)
PWA

PROJECT NUMBER: /
CONTRACT FOR: General Construction
CONTRACT DATE:

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER: ☐

TO OWNER:
(Name and address)

TO CONTRACTOR:
(Name and address)

PROJECT OR PORTION OF THE PROJECT DESIGNATED FOR PARTIAL OCCUPANCY OR USE SHALL INCLUDE:

The Work performed under this Contract has been reviewed and found, to the Architect's best knowledge, information and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated above is the date of issuance established by this Certificate, which is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:

Warranty **Date of Commencement**

ARCHITECT	BY	DATE OF ISSUANCE

A list of items to be completed or corrected is attached hereto. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment.

Cost estimate of Work that is incomplete or defective: $0.00

The Contractor will complete or correct the Work on the list of items attached hereto within Zero (0) days from the above date of Substantial Completion.

CONTRACTOR	BY	DATE

The Owner accepts the Work or designated portion as substantially complete and will assume full possession at (time) on (date).

OWNER	BY	DATE

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance shall be as follows:
(Note: Owner's and Contractor's legal and insurance counsel should determine and review insurance requirements and coverage.)

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AIA® Document G706™ – 1994

Contractor's Affidavit of Payment of Debts and Claims

PROJECT: *(Name and address)* PWA	**ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐ ARCHITECT: ☐
	CONTRACT FOR: General Construction	CONTRACTOR: ☐
TO OWNER: *(Name and address)*	**CONTRACT DATED:**	SURETY: ☐ OTHER: ☐

STATE OF:
COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA Document G707, Consent of Surety, may be used for this purpose

Indicate Attachment ☐ Yes ☒ No

The following supporting documents should be attached hereto if required by the Owner:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.
3. Contractor's Affidavit of Release of Liens (AIA Document G706A).

CONTRACTOR: *(Name and address)*

BY: _____
(Signature of authorized representative)

_____
(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

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User Notes:

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AIA® Document G706A™ - 1994

Contractor's Affidavit of Release of Liens

PROJECT: *(Name and address)*

PWA

TO OWNER: *(Name and address)*

ARCHITECT'S PROJECT NUMBER:

CONTRACT FOR: General Construction

CONTRACT DATED:

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
SURETY: ☐
OTHER: ☐

STATE OF:
COUNTY OF:

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR: *(Name and address)*

BY:

(Signature of authorized representative)

(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

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AIA® Document G707™ – 1994

Consent Of Surety to Final Payment

PROJECT: *(Name and address)* PWA	**ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐ ARCHITECT: ☐
	CONTRACT FOR: General Construction	CONTRACTOR: ☐
TO OWNER: *(Name and address)*	**CONTRACT DATED:**	SURETY: ☐ OTHER: ☐

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above the
(Insert name and address of Surety)

, SURETY,

on bond of
(Insert name and address of Contractor)

, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to
(Insert name and address of Owner)

, OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

_____
(Surety)

_____
(Signature of authorized representative)

Attest:
(Seal):

_____
(Printed name and title)

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User Notes: (1299412312)

PART 1 - GENERAL

1.01 BRIEF PURPOSE OF PROJECT / GENERAL

A. The purpose of the project is to replace flooring, seating, sound system, stage lighting and controls. As well as refurbish and extend the stage floor, replace stage rigging, replace pendant lighting, and improve the overall acoustics of the space which includes new finishes throughout. The existing HVAC system will be removed and replaced with a new system, including new roof top units which require modification of the existing roof structure..

B. This Section provides an abbreviated summary of the work for the Construction Contracts associated with the Owner's program to construct the project.

C. In the event that any of the provisions in the technical specifications conflicts with the general conditions, the provision more favorable to the owner, as determined by the owner in its sole discretion, shall govern.

1.02 NOMENCLATURE

A. Where the terms "Engineer/Architect", "Architect/Engineer", "Engineer", or "Architect" are used throughout these Contract Documents, they shall mean the firm of H2M architects + engineers as may be abbreviated by H2M or H2M Group.

B. Where the terms "Owner" or "Owner's Construction Representative" are used, they will be defined as a person selected by the Owner, or the actual Owner, Port Chester Rye Union Free School District.

1.03 ABBREVIATED SUMMARY OF CONTRACT E WORK

A. Furnish all labor, equipment, materials, tools, means, methods, and incidentals necessary to complete the Work as required by the Contract Documents for this Construction Contract. Each Contractor shall coordinate, through the Owner/Architect/Engineer, the work of their contract with the work by others.

1.04 ABBREVIATED SUMMARY OF CONTRACT M WORK

A. Furnish all labor, equipment, materials, tools, means, methods, and incidentals necessary to complete the Work as required by the Contract Documents for this Construction Contract. Each contractor shall coordinate, through the Owner/Architect/Engineer, the work of their contract with the work by others.

1.05 PARTIAL LISTING OF SPECIFIC CONTRACT REQUIREMENTS

A. The Contract Documents detail the work included in the Contract. Related requirements and conditions covered by the Contract Documents include, but are not limited to, the following:
   1. The contractor shall adhere to all New York State Education Department requirements, including but not limited to NYCRR, Title 8, Chapter 2, Part 155.5 - Uniform Safety Standards for School Construction and Maintenance.

1.06 PARTIAL LISTING OF OVERALL CONTRACT REQUIREMENTS

A. The Contract Documents detail the work included in the Contract. Related requirements and conditions covered by the Contract Documents include, but is not limited to, the following:
   1. Debris removal and daily and final cleaning up.
   2. Site utilization and management so as not to disrupt the Owner’s ability to operate the existing facilities in a safe and efficient manner.
   3. Product and equipment storage and handling requirements.
   4. Site safety in accordance with all applicable federal, state, and local regulations.
   5. Project submittals, testing services, , work plans, , schedules, , shop drawings, , closeout procedures and documents, , manuals, , as-built drawings, , and final commissioning, of the work shall be provided as required by the Contract.

1.07 OWNER SUPPLIED PRODUCTS AND UTILITIES

A. The Owner will not be supplying equipment, labor, or tools for the project.

1.08 EXISTING CONDITIONS

A. The Drawings show certain information that has been obtained by the Owner regarding various conditions that exist at the location of the project both below and at grade.

B. The Owner and the Architect/Engineer expressly disclaims all responsibility for the accuracy or completeness of the information given on the Drawings with regard to existing facilities.

C. In the case where the Contractor discovers an obstruction not indicated on the Drawings or not described via specification reference, then the Contractor shall immediately notify the Architect/Engineer of the obstructions' existence.

D. The Architect/Engineer will determine if the obstruction is to be relocated or removed.

E. Compensation for this extra work will be paid for in accordance with the provisions in the Contract for "Extra Work".

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. SED Commissioner's Uniform Safety Standards - Section155.5

B. Contractor use of the premises.

1.02 SITE ACCESS AND CONTROL

A. Contractors shall use the designated entrance to the site as shown on the drawings. If no site entrance is designated, Contractors shall use an entrance designated by the Owner's Construction Representative.
   1. The Owner may permit, solely at the Owner's discretion, the temporary use of another entrance for site access.
   2. The Owner will only review requests made by the Contractor for an exception to the designated site entrance if made in writing at least 72 hours in advance of each of the times desired for use.

B. All contractors to maintain the entrance area clear of materials, vehicles and any other obstacle or debris. Failure to do so will result in a minimum back charge of $750 per occurrence.

C. The area around the site is a residential neighborhood. The Owner intends to be a good neighbor. Contractors shall not close any road for any period in time. The Contractors shall take whatever measures are necessary to not cause any inconvenience to the area's residents

D. All Contractors are responsible to employ methods to prevent construction materials and/or debris from leaving the site. All Contractors are responsible to routinely monitor the areas surrounding the site during the day as well as at the end of the work-day and to immediately clean up any area to its previous condition.

E. The Contractors shall employ methods to prevent the transmission of dirt from vehicles driving on exposed areas of the site from reaching the surrounding roadways. The Contractors will be responsible to immediately clean the roadway, should the measures being taken by the Contractors not satisfactorily control the transmission of any dirt to the roadway.

F. Any damages to areas outside the site, spills of soil, liquid, or any other material shall immediately be repaired, cleaned and restored to its previous condition.

G. The Contractors shall comply with all state and local requirements for allowable weight limits of vehicles on all roads.

H. The Owner reserves the right to back charge the Contractors for all costs associated with maintaining the grounds as well as maintaining areas outside the site, which may be disturbed by the Contractors should the Contractors fail to maintain or repair the aforementioned in a condition acceptable to the Owner.

1.03 CONTRACTOR USE OF THE PREMISES

A. Premises, for the purpose of this Contract, shall mean the site, buildings and other structures located within the property line or in any temporary or permanent construction easements identified on the plans.

B. The Contractors shall use and manage the premises and the associated construction activities as follows:
   1. To not hinder the Owner's ability to operate their facilities.
   2. To allow other Prime Contractors to install their work and complete their contractual obligations in the time period specified.
   3. To allow for stockpiling of construction material and debris without any significant hardship, as defined by the Owner's Construction Representative, on the Owner or other contractors.
   4. To allow for the stockpiling of excavated soil and imported fill, when called for, without any significant hardship, as defined by the Owner's Construction Representative, on the Owner or other contractors.
   5. To allow utility companies to install their work.

6. To allow for the delivery of equipment and materials by independent trucking companies by leaving enough space for backing in and out of areas.
7. To allow for the safe, unimpeded travel way of the Owners vehicles, Owner's Construction Representative's vehicles, Architect/Engineer's vehicles, construction vehicles and heavy construction equipment about the entire site.

C. Contractors shall maintain the premises in a safe condition throughout the construction period. Compliance with OSHA regulations and site safety shall be the responsibility of the Contractor as it relates to work of the Contract. The posting of all applicable OSHA safety signs shall be the responsibility of the Contractors.

D. Contractors shall be responsible for protecting Owner's property. All existing buildings, structures, shrubs, trees, lawn fixtures, sculptures and misc. equipment shall be protected at all times. Any removals or relocation of said objects, if allowed shall be as directed by Owner's Construction Representative.

E. Contractors shall protect all of the physical structures, property and improvements upon the site from damage by their Work and shall immediately repair or replace damage caused by construction operations, employees or equipment employed by the Contractor. All labor, materials and equipment and outside contractors that are employed by the Owner to repair damage caused by the Contractor shall be billed to the Contractor directly or withheld from money due the Contractor for work already completed.

F. Immediately remove excess excavated material or relocate to areas on the site requiring placement of fill. Do not stockpile excess material on the site.

G. The construction site space is limited and it shall be the General Contractor's responsibility to manage the site during the entire construction period with input from all concerned parties as to meeting their needs. Equal consideration of the needs of others with that of the Contractor's shall be provided as judged by the Owner.

H. Due to the limited site area available for construction, staging areas shall be relocated several times during the various stages of construction. Additional compensation for relocating staging areas, equipment and material storage, and trailers are not to be considered an extra cost to the Contractor as this is an anticipated expense that shall be considered at the time of the bid.

I. Contractors are responsible for cleaning up their own materials and debris. Failure to maintain a clean work site daily, will result in other performing the work and Contractors being back charged for the cleaning cost plus construction administration fees.

J. Use of the existing building facilities during construction is prohibited including but not limited to: toilet rooms, telephone and water fountains. Contractors shall be fined ($250) per occurrence if their employee (or subcontractor's employee) is observed disregarding these rules.

K. Should it become necessary to access the existing building during construction hours for measurements or other non-disruptive work, the contractor shall be escorted by an Owner's Construction Representative.

L. Do not discard or dispose of any waste on-site.

M. Open fires will not be permitted on the site.

N. The Sitework Contractor shall employ erosion control measures to protect wetlands located adjacent to the work where shown on the Drawings and as required by regulatory agencies.

O. Install erosion control measures as indicated in the Contract. The Contractor shall confine stormwater runoff to the site.

1.04 CONTRACTOR STORAGE, PARKING AND DELIVERIES

A. Contractors must provide exterior storage containers when required. Final location of storage container shall be determined by the Owner.

B. Do not unreasonably encumber the premises with materials and equipment. Do not store material in existing buildings. Store all equipment and materials to allow the Owner's employees to operate and conduct their business safely.

C. Confine premise storage areas to locations designated by the Owner. Immediately repair or replace damaged facilities to the satisfaction of the Owner and to a condition that existed before the damage occurred as determined by preconstruction photographs, or if photographs are unavailable, to that deemed by the Owner.

D. No materials storage will be permitted within the buildings at any time during construction.

E. Storage of chemicals and paint materials shall be outside the existing or new structures and shall follow manufacturer's storage/handling guidelines.

F. Compressed gas containers shall be properly stored and secured per OSHA, to the satisfaction of the Owner. Failure to do so will result in a $250 back charge, per occurrence.

G. Contractors shall provide minimum of 48 hours advance written notice to the Owner's Construction Representative for deliveries of materials, site visits by inspectors, manufacturer's representatives or any other occasion that impacts the use of the site. Contractors shall be responsible for any costs that are incurred by the owner, for failure to meet previously agreed upon appointments or work schedules.

H. Deliveries sent to the Owner will not be signed for or unloaded by the Owner. They will be directed to the construction site and if no employee is on site, the delivery will be rejected, at the contractor's expense.

I. Night deliveries of equipment (past the designated quitting time) will not be permitted. Do not schedule trucking companies to deliver equipment or wait for the job site to open. Delivery trucks shall not obstruct the site entrance, shall not sit within the neighborhood causing an obstruction or perceived nuisance, nor be left idling on or off the site for any period of time.

J. Parking shall be in the designated areas of the site only. All automotive type vehicles are to be locked when parked or unattended to prevent unauthorized use. Do not leave vehicles or equipment unattended with the motor running or the ignition key in place. Any vehicles or trucks in non-designated areas may be towed at contractor's expense.

1.05 WORK HOURS, EMPLOYEE CONDUCT AND MISCELLANEOUS EMPLOYEE REQUIREMENTS

A. The Contractors will be permitted to schedule working days and hours as specified in the General Terms and Conditions, if no times are specified therein then the work hours shall be Monday - Friday 8:00 am - 4:00 pm.

B. Employees are to act in a professional manner. Any employee using inappropriate language or who is disruptive to the work environment will be banned from the site.

C. Proper work attire is required. Shirts are to be worn at all times and no short pants are permitted.

D. Comply with the Owner's Identification and Personal Protection Policies. A copy of the current policy will be distributed at the initial job meeting.

E. Employees shall not converse with local residents or Owner's employees.

F. Any employee found under the influence of any drug or alcohol will be banned from the site.

G. The following items are not allowed on the Site or the Owner's premises. Any person observed to bear any of the following items will be immediately removed from the site.
   1. Firearms, ammunition, weapons, and dangerous instruments (other than tools required for the work).
   2. Alcoholic beverages or illegal controlled substances.
   3. Cameras (except with written permission from the Owner).

H. Smoking is not permitted withing the building except for outdoors at least 100 feet from any window, louver, or door. Comply with the Owner's policies relating to smoking at the Site.

I. The Contractors shall schedule working days and hours as specified. The contractor shall pay all excess costs for working beyond the times specified. This includes the cost of the owner's employees to keep the building/site open and/or the cost of the additional services for the construction manager.

1.06 UNIFORM SAFETY STANDARDS - SECTION 155.5 - UNIFORM SAFETY STANDARDS FOR SCHOOL CONSTRUCTION AND MAINTENANCE PROJECTS.

Disclaimer: These Rules of the Regents and Regulations of the Commissioner of Education ("regulations") are unofficial, and are presented for general informational purposes as a public service. Although reasonable efforts have been made to ensure that these regulations are current, complete and accurate, the State Education Department does not warrant or represent that they are current, complete and accurate. These regulations are subject to change on a regular basis. Readers are advised to consult Title 8 of the Official Compilation of Codes, Rules and Regulations of the State of New York (8 NYCRR), published by the Department of State, and the State Register external link for the official exposition of the text of these regulations, as well as for amendments and any subsequent changes or revisions thereto.

A. Monitoring of construction and maintenance activities.
   1. 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.
   1. 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.
      a. 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.
      b. 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.
      c. The district emergency management plan shall be updated to reflect any changes necessary to accommodate the construction process, including and be i 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.
      d. 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.

C. Pre-construction testing and planning for construction projects.
   1. 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.

D. 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.

E. Separation of construction areas from occupied spaces.
   1. 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.
      a. 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.
      b. 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.
      c. 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.

F. Maintaining exiting and ventilation during school construction projects.
   1. The following information shall be included in all plans and specifications for school building projects:
      a. 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.
      b. 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.

G. Fire and hazard prevention.
   1. Areas of buildings under construction that are to remain occupied shall maintain a certificate of occupancy. In addition, the following shall be strictly enforced:

a. (1) No smoking is allowed on public school property, including construction areas.
b. (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.
c. (3) Proper operation of fire extinguishers, fire alarm, and smoke/fire detection systems shall be maintained throughout the project.

H. Noise abatement during construction and maintenance activities.
1. 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.

I. Control of chemical fumes, gases, and other contaminants during construction and maintenance projects.
1. 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.
a. 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.
b. Manufacturer's material safety data sheets (MSDS) 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.

J. Asbestos abatement protocols.
1. 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.

K. Lead paint.

1. 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.

L. Radon.
1. 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.

M. Post construction inspection.
1. The school district or board of cooperative educational services shall provide the opportunity for a walk-through inspection by the health and safety committee members to confirm that the area is ready to be reopened for use.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Site access and control of areas outside of site.

B. Contractor use of the premises.

C. Contractor storage, parking and deliveries.

D. Work hours, employee conduct and miscellaneous employee requirements.

1.02 SITE ACCESS AND CONTROL

A. Contractors shall use the designated entrance to the site as shown on the drawings. If no site entrance is designated, Contractors shall use an entrance designated by the Owner's Construction Representative.
   1. The Owner may permit, solely at the Owner's discretion, the temporary use of another entrance for site access.
   2. The Owner will only review requests made by the Contractor for an exception to the designated site entrance if made in writing at least 72 hours in advance of each of the times desired for use.

B. All contractors to maintain the entrance area clear of materials, vehicles and any other obstacle or debris. Failure to do so will result in a minimum back charge of $750 per occurrence.

C. The area around the site is a residential neighborhood. The Owner intends to be a good neighbor. Contractors shall not close any road for any period in time. The Contractors shall take whatever measures are necessary to not cause any inconvenience to the area's residents

D. All Contractors are responsible to employ methods to prevent construction materials and/or debris from leaving the site. All Contractors are responsible to routinely monitor the areas surrounding the site during the day as well as at the end of the work-day and to immediately clean up any area to its previous condition.

E. The Contractors shall employ methods to prevent the transmission of dirt from vehicles driving on exposed areas of the site from reaching the surrounding roadways. The Contractors will be responsible to immediately clean the roadway, should the measures being taken by the Contractors not satisfactorily control the transmission of any dirt to the roadway.

F. Any damages to areas outside the site, spills of soil, liquid, or any other material shall immediately be repaired, cleaned and restored to its previous condition.

G. The Contractors shall comply with all state and local requirements for allowable weight limits of vehicles on all roads.

H. The Owner reserves the right to back charge the Contractors for all costs associated with maintaining the grounds as well as maintaining areas outside the site, which may be disturbed by the Contractors should the Contractors fail to maintain or repair the aforementioned in a condition acceptable to the Owner.

1.03 CONTRACTOR USE OF THE PREMISES

A. Premises, for the purpose of this Contract, shall mean the site, buildings and other structures located within the property line or in any temporary or permanent construction easements identified on the plans.

B. The Contractors shall use and manage the premises and the associated construction activities as follows:
   1. To not hinder the Owner's ability to operate their facilities.
   2. To allow other Prime Contractors to install their work and complete their contractual obligations in the time period specified.
   3. To allow for stockpiling of construction material and debris without any significant hardship, as defined by the Owner's Construction Representative, on the Owner or other contractors.

4. To allow for the stockpiling of excavated soil and imported fill, when called for, without any significant hardship, as defined by the Owner's Construction Representative, on the Owner or other contractors.
5. To allow utility companies to install their work.
6. To allow for the delivery of equipment and materials by independent trucking companies by leaving enough space for backing in and out of areas.
7. To allow for the safe, unimpeded travel way of the Owners vehicles, Owner's Construction Representative's vehicles, Architect/Engineer's vehicles, construction vehicles and heavy construction equipment about the entire site.

C. Contractors shall maintain the premises in a safe condition throughout the construction period. Compliance with OSHA regulations and site safety shall be the responsibility of the Contractor as it relates to work of the Contract. The posting of all applicable OSHA safety signs shall be the responsibility of the Contractors.

D. Contractors shall be responsible for protecting Owner's property. All existing buildings, structures, shrubs, trees, lawn fixtures, sculptures and misc. equipment shall be protected at all times. Any removals or relocation of said objects, if allowed shall be as directed by Owner's Construction Representative.

E. Contractors shall protect all of the physical structures, property and improvements upon the site from damage by their Work and shall immediately repair or replace damage caused by construction operations, employees or equipment employed by the Contractor. All labor, materials and equipment and outside contractors that are employed by the Owner to repair damage caused by the Contractor shall be billed to the Contractor directly or withheld from money due the Contractor for work already completed.

F. Immediately remove excess excavated material or relocate to areas on the site requiring placement of fill. Do not stockpile excess material on the site.

G. The construction site space is limited and it shall be the General Contractor's responsibility to manage the site during the entire construction period with input from all concerned parties as to meeting their needs. Equal consideration of the needs of others with that of the Contractor's shall be provided as judged by the Owner.

H. Due to the limited site area available for construction, staging areas shall be relocated several times during the various stages of construction. Additional compensation for relocating staging areas, equipment and material storage, and trailers are not to be considered an extra cost to the Contractor as this is an anticipated expense that shall be considered at the time of the bid.

I. Contractors are responsible for cleaning up their own materials and debris. Failure to maintain a clean work site daily, will result in other performing the work and Contractors being back charged for the cleaning cost plus construction administration fees.

J. Use of the existing building facilities during construction is prohibited including but not limited to: toilet rooms, telephone and water fountains. Contractors shall be fined ($250) per occurrence if their employee (or subcontractor's employee) is observed disregarding these rules.

K. Should it become necessary to access the existing building during construction hours for measurements or other non-disruptive work, the contractor shall be escorted by an Owner's Construction Representative.

L. Do not discard or dispose of any waste on-site.

M. Open fires will not be permitted on the site.

N. The Sitework Contractor shall employ erosion control measures to protect wetlands located adjacent to the work where shown on the Drawings and as required by regulatory agencies.

O. Install erosion control measures as indicated in the Contract. The Contractor shall confine stormwater runoff to the site.

1.04 CONTRACTOR STORAGE, PARKING AND DELIVERIES

A. Contractors must provide exterior storage containers when required. Final location of storage container shall be determined by the Owner.

B. Do not unreasonably encumber the premises with materials and equipment. Do not store material in existing buildings. Store all equipment and materials to allow the Owner's employees to operate and conduct their business safely.

C. Confine premise storage areas to locations designated by the Owner. Immediately repair or replace damaged facilities to the satisfaction of the Owner and to a condition that existed before the damage occurred as determined by preconstruction photographs, or if photographs are unavailable, to that deemed by the Owner.

D. No materials storage will be permitted within the buildings at any time during construction.

E. Storage of chemicals and paint materials shall be outside the existing or new structures and shall follow manufacturer's storage/handling guidelines.

F. Compressed gas containers shall be properly stored and secured per OSHA, to the satisfaction of the Owner. Failure to do so will result in a $250 back charge, per occurrence.

G. Contractors shall provide minimum of 48 hours advance written notice to the Owner's Construction Representative for deliveries of materials, site visits by inspectors, manufacturer's representatives or any other occasion that impacts the use of the site. Contractors shall be responsible for any costs that are incurred by the owner, for failure to meet previously agreed upon appointments or work schedules.

H. Deliveries sent to the Owner will not be signed for or unloaded by the Owner. They will be directed to the construction site and if no employee is on site, the delivery will be rejected, at the contractor's expense.

I. Night deliveries of equipment (past the designated quitting time) will not be permitted. Do not schedule trucking companies to deliver equipment or wait for the job site to open. Delivery trucks shall not obstruct the site entrance, shall not sit within the neighborhood causing an obstruction or perceived nuisance, nor be left idling on or off the site for any period of time.

J. Parking shall be in the designated areas of the site only. All automotive type vehicles are to be locked when parked or unattended to prevent unauthorized use. Do not leave vehicles or equipment unattended with the motor running or the ignition key in place. Any vehicles or trucks in non-designated areas may be towed at contractor's expense.

1.05 WORK HOURS, EMPLOYEE CONDUCT AND MISCELLANEOUS EMPLOYEE REQUIREMENTS

A. The Contractors will be permitted to schedule working days and hours as specified in the General Terms and Conditions, if no times are specified therein then the work hours shall be Monday - Friday 7:00 am - 3:00 pm unless otherwise noted by the owner during the construction kickoff meeting.

B. Employees are to act in a professional manner. Any employee using inappropriate language or who is disruptive to the work environment will be banned from the site.

C. Proper work attire is required. Shirts are to be worn at all times and no short pants are permitted.

D. Comply with the Owner's Identification and Personal Protection Policies. A copy of the current policy will be distributed at the initial job meeting.

E. Employees shall not converse with local residents or Owner's employees.

F. Any employee found under the influence of any drug or alcohol will be banned from the site.

G. The following items are not allowed on the Site or the Owner's premises. Any person observed to bear any of the following items will be immediately removed from the site.
   1. Firearms, ammunition, weapons, and dangerous instruments (other than tools required for the work).
   2. Alcoholic beverages or illegal controlled substances.
   3. Cameras (except with written permission from the Owner).

H. Smoking is not permitted withing the building except for outdoors at least 100 feet from any window, louver, or door. Comply with the Owner's policies relating to smoking at the Site.

I. The Contractors shall schedule working days and hours as specified. The contractor shall pay all excess costs for working beyond the times specified. This includes the cost of the owner's employees to keep the building/site open and/or the cost of the additional services for the construction manager.

1.06 UNIFORM SAFETY STANDARDS

A. Section 155.5 Uniform Safety Standards for School Construction and Maintenance Projects

Disclaimer: These Rules of the Regents and Regulations of the Commissioner of Education ("regulations") are unofficial, and are presented for general informational purposes as a public service. Although reasonable efforts have been made to ensure that these regulations are current, complete and accurate, the State Education Department does not warrant or represent that they are current, complete and accurate. These regulations are subject to change on a regular basis. Readers are advised to consult Title 8 of the Official Compilation of Codes, Rules and Regulations of the State of New York (8 NYCRR), published by the Department of State, and the State Register <http://www.dos.state.ny.us/info/register.htm> for the official exposition of the text of these regulations, as well as for amendments and any subsequent changes or revisions thereto.

1. Monitoring of construction and maintenance activities.
   a. 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.
      1) 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.
   1) 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.
   1) 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.
   2) 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.
   3) 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.
   4) 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.
   1) The following information shall be included in all plans and specifications for school building projects:
      (a) 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.

(b) 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.

1) Areas of buildings under construction that are to remain occupied shall maintain a certificate of occupancy. In addition, the following shall be strictly enforced:

(a) No smoking is allowed on public school property, including construction areas.

(b) 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.

(c) 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.

1) 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.

1) 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.

2) 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.

3) Manufacturer's material safety data sheets (MSDS) 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.

1) 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.
   1) 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.
   1) 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.
   1) The school district or board of cooperative educational services shall provide the opportunity for a walk-through inspection by the health and safety committee members to confirm that the area is ready to be reopened for use.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Site Utilization Plan requirements

1.02 SITE UTILIZATION PLAN REQUIREMENTS

A. Each Contractor shall prepare a Site Utilization Plan (SUP) showing staging areas, parking areas, stockpile areas, debris container areas, unloading areas, and trailer areas for review by the Architect/Engineer and Owner's Construction Representative. The length and number of meetings necessary to develop and adopt a SUP shall be as required.

B. Meetings will be held at the site with all concerned parties to assist the Contractor in developing the criteria for the plan. During these meetings, all parties will present their needs and requirements for site utilization. Representatives from the local municipality or utility companies may be attending. The requirements of the local municipality and utility companies shall be incorporated into the SUP.

C. Each Contractor shall then prepare a draft site plan that attempts to incorporate the needs of all concerned parties. Another meeting will then be held at the site to review and present the plan. The plan shall then be revised at that meeting and adopted for use if it is acceptable to all relevant parties. If all parties cannot agree on an acceptable plan, then the Owner's Construction Representative will establish the Site Utilization Plan without any claims from any contractor.

D. Each Contractor, by submitting a bid, understands the importance of a workable Site Utilization Plan and also understands that the Owner's Construction Representative may be required to select a plan for the contractor to adopt that is not ideal to the planned construction activities anticipated before the bid was submitted. There shall be no claims for damages associated with site utilization.

E. If the Contractor fails to prepare the Site Utilization Plan as stipulated above, then the Owner reserves the right to back charge the Contractor for the costs associated with having a Site Utilization Plan developed.

F. If a Prime Contractor fails to participate or attend the meetings scheduled to develop the Site Utilization Plan then the Prime Contractor will forfeit any right to comment on the plan that is developed.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 011419

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Allowance pricing for the following items:
   1. Contingency Account.

B. This Section covers the requirements for use of the cash allowances listed above contained in the proposal (Bid Forms, Price Schedule) and included in the Contract Price bid by the Contractor and defines and stipulates the charges that will be paid for out of the stipulated allowances.

C. The Contractor shall include the cash allowances stipulated in this Section in the amount bid (Base Bid).

D. Eligible costs described in this Section, and Sections referenced herein, will be the only costs paid for out of the stipulated allowances.

E. All other costs associated with the project as specified and/or shown, including but not limited to the delivery, installation and all Contractor overhead and/or collateral expenses are to be distributed among the other portions of the work and shall be included in the lump sum base bid.

1.02 SUBMITTALS

A. Make all submissions under the provisions of Section 013300.

B. For each type of product/material specified to be furnished under allowance pricing provide documentation of the unit pricing on manufacturer's letterhead certifying pricing of the product/material.

C. Submit additional backup information to substantiate the invoiced amount(s) as the Architect/Engineer may require for review and approval, prior to order or payment of item.

D. Provide written breakdowns for extra work as the Owner may require.

1.03 CHANGES TO STIPULATED (CASH) ALLOWANCE

A. If the actual cost of services differs from the cash allowance, then the Contract Price will be adjusted accordingly.

1.04 PAYMENTS TO BE MADE OUT OF CONTINGENCY ACCOUNT

A. Include the cash allowance as shown in the proposal, in the amount bid for use upon the Owner's instructions.

B. The Owner will draw funds from the contingency account only upon prior written approval by the Owner's Construction Field Representative and Architect/Engineer.

C. Funds remaining at project closeout shall be credited to the Owner.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Submission procedures.

B. Documentation of changes to Contract Sum/Price and Contract Time.

1.02 RELATED SECTIONS

A. Proposal Form.

B. Other sections referencing this section.

C. All contractual requirements outlined in the documents.

1.03 SUBMISSION REQUIREMENTS

A. Submit Alternates on Proposal Forms identifying the effect on adjacent or related components.

B. Alternates will be reviewed and accepted or rejected at the Owner's option.

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

1.04 SELECTION AND AWARD OF ALTERNATES

A. Indicate variation of Bid Price for Alternates listed on the PROPOSAL FORM. This form requests a "difference" in Bid Price by adding to or deducting from the base Bid Price.

B. Alternates quoted on PROPOSAL FORM will be reviewed and accepted or rejected at Owner’s option.

C. Accepted alternates will be identified in Owner-Contractor Agreement.

D. Bids will be evaluated on the base bid price, plus any combination of alternate items.

1.05 WORK FOR ALTERNATES

A. Work for alternate items selected shall include all related materials, labor, equipment and operations necessary to conduct and complete the alternate work and all other affected work or adjacent areas.

B. There shall be no change in time or completion date for the selected alternates, unless specified herein or approved in writing by the Architect/Engineer and Owner.

C. Alternates and associated work shall meet all standards and specifications delineated in the Contract Documents.

D. Contractor shall coordinate pertinent related Work and modify surrounding Work as required to complete the project under each alternate selected by the Owner.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 PROCEDURES

A. Work for each alternate, related items and collateral work shall be completed in their entirety.

B. If alternate items are not selected, work for the base bid and collateral work shall be completed in their entirety.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. **This Section includes the requirements for substitution of specified products during construction.**

B. *The Architect/Engineer will consider requests for substitutions only within **two (2)** business days following the Bid Opening.*

C. Products named by the Bidder, at the time of bid, shall be furnished and installed and substitutions will not be considered by the Owner/Architect/Engineer for those products.

1.02 CONTRACTOR'S OPTIONS

A. For products specified only by reference standard, select any product meeting that standard.

B. For products specified by naming several products or manufacturers, select any one of the products or manufacturers named which complies with the Specifications.

C. Where products are not named, then submit products that meet the specifications.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. Name - The Drawings and Specifications list acceptable manufacturers, commercial names, trademarks, brands and other product, material and equipment designations. Such names are provided to establish the required type, quality and other salient requirements of procurement.

B. Equals - An item equal to that named or described on the Drawings or in the Specifications may be provided by Contractor if accepted in writing by the Architect/Engineer.

C. A request for product substitution constitutes a representation that the Contractor:
   1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
   2. Shall provide the same warranty for the Substitution as for the specified Product.
   3. Shall coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner, including extra charges by other Prime Contractors, material suppliers, and vendors.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. May be responsible to reimburse the Owner <> for review or redesign services associated with re-approval by authorities, if required.
   6. May be responsible to reimburse the Owner for all additional A/E services needed by the Architect/Engineer for extra services associated with the review of the Contractor's substituted item since it could not have been originally included in the Architect/Engineer's professional engineering services agreement. Reimbursement shall be based on the man-hours expended, at current billing rates. A copy of the billing rates will be provided to the contractor for approval prior to services being provided.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Substitution Submittal Procedure:
   1. The Contractor shall submit three (3) copies of the REQUEST FOR SUBSTITUTION FORM for consideration including all required information.
   2. The Contractor shall use the form included within this Section.
   3. All forms shall be type written.
   4. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.

F. The burden to prove product equivalence rests on the Contractor.

G. The Architect/Engineer will notify Contractor in writing of decision to accept or reject request and at that time the Contractor can make a formal submittal in accordance with the requirements contained in Section 013300.

H. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor or the Architect.

PART 3 - EXECUTION

NOT USED

This space left intentionally blank.

REQUEST FOR SUBSTITUTION FORM

Project: Port Chester Middle School Auditorium	Substitution Request Number:_____
Contractor:_____	
Address:_____	
To:_____	Date:_____
H2M Project Number: PRSD2414	Owner: Port Chester Rye Union Free School District
Contract Name:_____	Contract No.:_____
Specification Title:_____	
Section:_____ Page:_____	Article/Paragraph:_____
Drawing No(s).:_____	
Proposed Substitution:_____	
Manufacturer:_____	Address:_____
Trade Name:_____	Phone #: (____)_____
Installer:_____	Address:_____
Phone #: (____)_____	
History: ___New product ___2-5 years old ___5-10 years old ___More than 10 years old	
Differences between proposed substitution and specified product:	
___Point-by-point comparative data attached	
Reason for not providing specified item (Attach separate sheet if necessary):	

Typical Similar Installation:

Project:_____

Engineer /
Architect:_____

Address:_____

Owner:_____

Date Installed:_____

Submit complete installation list on separate sheets.

Proposed substitution affects other parts of Work: ___No ___Yes

Explain:_____

Gross Savings to Owner for accepting substitution: $_____

Proposed substitution changes Contract Time: ___No ___Yes

Add / deduct (circle):_____ days

Supporting data attached for evaluation of the proposed substitution:

___Product Data ___Photos ___Drawings ___Tests ___Reports ___Samples

___Other (explain):_____

Attached data includes description, specifications, drawings, photographs, performance and test data adequate for evaluation of request; applicable portions of data are clearly identified.

Attached data also includes a description of changes to Contract Documents that proposed substitution will require for its proper installation.

The undersigned certifies that the following paragraphs, unless modified by attachments, are correct:	
1.	Proposed Substitution has been fully checked and coordinated with Contract Documents.
2.	Proposed Substitution does not affect dimensions shown on Drawings.
3.	Proposed Substitution does not require revisions to any other Prime Contractor's work.
4.	The undersigned will pay for changes to building design, including Architectural and Engineering design, detailing, and construction costs caused by requested Substitution.
5.	Proposed Substitution will have no adverse affect on other trades, construction schedule, or specified warranty requirements.
6.	Maintenance and service parts will be locally available for proposed substitution.
7.	The undersigned further states that the function, appearance, and quality of proposed Substitution are equivalent or superior to specified item.
This request for product substitution also constitutes a representation that I, as the Contractor:	
1.	Has investigated proposed Product and determined that it meets or exceeds the quality of the specified Product.
2.	Shall provide the same warranty for the Substitution as for the specified Product.
3.	Shall coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner, including extra charges by other Prime Contractors, material suppliers, and vendors.
4.	Waives claims for additional costs or time extension that may subsequently become apparent.
5.	Shall reimburse the Owner and the Architect/Engineer for review or redesign services associated with re-approval by authorities.
6.	Shall reimburse the Owner for all additional engineering services claimed by the Architect/Engineer for extra services associated with the review of the Contractor's substituted item since it could not have been originally included in the Architect/Engineer's professional engineering services agreement. Reimbursement shall be based on the man-hours expended, at current billing rates.
Contractor's Authorized Representative (Typewritten):_____	
Authorized Signature:_____	
Date:_____	

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work under this Section specifies the procedures used to process partial payments and the Final Payment Request.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements governing each prime contractor's Applications for Payment.
   1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, Submittal Schedule, and List of Subcontracts.

B. Related Sections: The following Sections contain requirements that relate to this Section.
   1. Schedules: The Contractor's Construction Schedule and Submittal Schedule are specified in Division 01 - Section 013300 - SUBMITTALS.

1.03 TIME FOR COMPLETION

A. Inasmuch as the provisions of the Contract relating to the time for performance and completion of the Work are for the purposes of enabling the Owner to proceed with the construction of a public improvement in accordance with a predetermined program, and inasmuch as failure to complete the Work within the period herein specified may result in damage or loss to the Owner, time is of the essence of the Contract.

B. Time for completion of the Work shall be in accordance with that stipulated in the Contract Documents.

C. The date for completion will be calculated from the date shown on the Notice to Proceed. The Contractor shall execute the Work with diligence from day to day, and complete it within the time fixed.

D. For the purpose of defining the date of substantial completion, the Project will be considered complete when all Work covered by the Contract has been performed and all installations and equipment have been tested and are ready for permanent use. Contractor shall provide a copy of the final Certificate of Occupancy from the AHJ prior to issuance of the final payment. Removal of the Contractor's plant and equipment and other minor adjustments which do not prevent use of the Project will not be a factor in establishing the date of substantial completion.

E. Notwithstanding the foregoing, the Architect/Engineer will establish the date of substantial completion when the project is accepted and ready for operation, and no large or major items of work are as yet outstanding. At such time, the Architect/Engineer will issue a punch list, itemizing the items of work remaining. The punch list will include "minor" items only, as defined solely by the Architect/Engineer. Any prior punch lists, which include "major" or significant items, as defined by the Architect/Engineer, shall not be a criterion in establishing the date of substantial completion.

1.04 PARTIAL COMPENSATION

A. At the Owner's discretion, the Contractor may receive compensation for materials and products delivered to the site yet not installed providing:
   1. A canceled check or paid bill from the supplier is submitted to the Architect/Engineer indicating that the Contractor has paid the supplier for the material or equipment.
   2. The material or piece of equipment is properly stored and protected from the elements and/or vandalism in accordance with the manufacturer's written requirements for long term storage.
   3. A certificate of insurance is provided for the material or piece of equipment in the event of a fire, vandalism, theft, etc.
   4. A bill of material is delivered to the Architect/Engineer at the time of delivery itemizing the subject material or equipment. Payment will be made for on-site material and/or equipment in the amount of 80% of the gross amount of the paid invoice. This payment will be subject to the normal retainage of the partial estimate.

5. The Architect/Engineer has agreed to the pre-purchasing of the materials.

B. The Contractor may not receive compensation for materials and products stored in the Contractor’s yard or shop unless permitted by the Owner.

1.05 SCHEDULE OF VALUES

A. Coordination: Contractor shall coordinate preparation of its Schedule of Values for the Work with preparation of the Contractors' Construction Schedule.
   1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
      a. Contractor's Construction Schedule.
      b. Application for Payment forms, including Continuation Sheets.
      c. List of subcontractors.
      d. Schedule of allowances.
      e. Schedule of alternates.
      f. Schedule of submittals.
   2. Submit the Schedule of Values (SOV) to the Owner's Construction Representative within 10 days of receipt of Letter of Intent but no later than 10 days before the date scheduled for submittal of the initial Applications for Payment. (SOV received after the 15 day of the month, will not be accepted for review until the following month to allow for computer system input time required by the Owner's Construction Representative and the Owner.

B. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. Provide at least one item for each Specification Section.
   1. Identification: Include the following Project Identification on the Schedule of Values:
      a. Project name and location. (Each school and additions / renovations will require separate breakdown sections and front end with subtotals.
      b. Name of the Architect/Engineer.
      c. Architect's Project Number.
      d. Contractor's name and address.
      e. Date of Submittal.
   2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
      a. Related Specification Section or Division.
      b. Description of Work.
      c. Name of subcontractor.
      d. Name of manufacturer or fabricator.
      e. Name of supplier.
      f. Change Orders (numbers) that affect value.
      g. Dollar value.
         1) Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
   3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Break principal subcontract amounts down into several line items where requested by Owner's Construction Representative. Multiple line items will be provided for amounts in excess of five percent of the contract sum, broken out into sub components equating not greater than five percent each. Separate all line items by material & labor.
      a. Breakdown shall be separated between additions and renovations with subtotals for each.
   4. In addition to the breakdown of specification sections , separate line items will be required for the following front-end line items:
      a. Bonds & OCP insurances shall have separate line items. (substantiation letters shall be required from bonding & insurance company for any amounts higher than industry standard). Only OCP insurance shall be allowed for the insurance line item. All other insurance costs must be distributed by contractor throughout the various sections.

b. Supervision: include a minimum of one percent of contract value.
c. Project Administration: include a minimum of one percent of contract value.
d. Project meetings (appropriate value for weekly attendance for entire duration of project - see Section 013119 Project Meetings).
e. Punchlist - include a minimum of two (2) percent of contract sum.
f. Closeout: separate lines for demobilization, Operation & Maintenance manuals, closeout paperwork and Demonstration & Training. All totaling a minimum two (2) percent of the Contract value.
g. Continuous Clean-up and Final Clean-up values each at a minimum of one half percent (0.5 % of the Contract value).
h. The General Construction Contractor shall add a line item for broom sweep/ damp mopping at an agreed to value.

5. Round amounts to nearest whole dollar; the total shall equal the Contract Value.
6. Provide a separate line item in the Schedule of Values (SOV) for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing.
7. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Unit-Cost Allowances: Show the line-item value of unit-cost allowances, as a product of the unit cost, multiplied by the measured quantity. Estimate quantities from the best indication in the Contract Documents.
9. Margins of Cost: Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expenses, at the discretion of the Contractor.
10. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Value.

1.06 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.
   1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

B. Payment-Application Times: Each progress-payment date is indicated in the Agreement. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment-Application Times: The date for each progress payment is the 21st day of each month (or as designated by the Owner). The period covered by each Application for Payment is the previous month.

D. Payment-Application Forms: Use AIA Document G732/CMa (include line for Owner's Construction Representative signature) and Continuation Sheets G703 as the form for Applications for Payment.
   1. Separate Continuation Sheets shall be provided for work which takes place on each building, which will detail that portion of the contract which is attributable to the specific building. The appropriate S.E.D. project number(s) shall be shown on the top of each continuation form.

E. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. The Owner's Construction Representative will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Allowances issued prior to the last day of the construction period covered by the application. (No Change order or Allowance requisitions can be made or listed on the requisition, unless the formal Change Order and Allowance paperwork has been fully executed by Contractor, Owner's Construction Representative, Architect and Owner).
3. Provide copies of payrolls which are signed and notarized documenting compliance with prevailing wage laws. Payrolls for contractors are required from the of the previous month to the 24th day of the current month. Payrolls for subcontractors are required from the 15th day of the previous month to the 14th day of the current month.
4. Provide copies of Lien Waivers for the previous payment (or anticipated payment). Include certificate of monthly payment for subcontractors for the previous month.
5. Provide OSHA 10 certificates for all workers on site.
6. Payment for stored materials (whether on-site but not installed, or offsite in a secured warehouse) will require a Bill of Lading showing the exact value accompanied by photographs of the actual materials. In no case shall more that 80% be approved for uninstalled stored materials. An Insurance certificate must be provided, specific to the materials stored with the appropriate dollar value (for on-site or offsite materials).

F. Transmittal: Submit five (5) signed and notarized original copies of each Application for Payment to the Owner's Construction Representative by a method ensuring receipt within 24 hours. Each copy shall be complete and securely attached and shall include all waivers of lien, certified payrolls and similar attachments.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to the Architect and Owner's Construction Representative.

G. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics liens from subcontractors, sub-subcontractors and suppliers for the construction period covered by the previous application.
   1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
   2. When an application shows completion of an item, submit final or full waivers.
   3. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
      a. Submit final Applications for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
   4. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to the Owner.

H. Initial Application for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment include the items listed below. The initial payment application will not be processed until all of these actions and submittals have been received by the Owner's Construction Representative. When preliminary submissions are received with the initial application (item 4 and item 7 listed below), the final submission for these items must be received and approved by the Owner's Construction Representative prior to submission of the second application for payment.
   1. List of subcontractors.
   2. List of principal suppliers and fabricators.
   3. Schedule of Values.
   4. Contractor's Construction Schedule (preliminary if not final).
   5. Schedule of principal products.
   6. Schedule of unit prices.
   7. Submittal Schedule (preliminary if not final).
   8. List of Contractor’s staff assignments.

9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from governing authorities for performance of the Work.
12. Initial progress report.
13. Report of preconstruction meeting.
14. Certificates of insurance and insurance policies.
15. Performance and payment bonds.
16. Data needed to acquire the Owner's insurance.
17. Initial settlement survey and damage report, if required.

I. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.

1.07 ACCEPTANCE OF FINAL PAYMENT REQUEST

A. The Contractor shall be conclusively deemed to have accepted the Final Payment Request as a correct statement of the total liability of the Owner and of the compensation paid and to be paid to the Contractor by the Owner unless within seven (7) days after delivery of his copy of the Final Payment Request to him, the Contractor shall return such copy to the Owner together with a statement of his objections to such request and of any claim for damages or compensation in excess of the amounts shown on the Request. The acceptance by the Contractor of the Final Payment Request approved by the Owner shall constitute a release and shall discharge the Owner from all further claims by the Contractor arising out of or relating to the Contract, including but not limited to, a release from all impact costs.

1.08 SCOPE OF PAYMENTS

A. The Contractor shall receive and accept the compensation as herein provided, in full payment for furnishing all materials, labor, tools, and equipment and for performing all work contemplated and embraced under the Contract, also for all loss or damage arising out of the nature of the Work or from the action of the elements, or from any unforeseen difficulties or obstructions which may arise or be encountered during the prosecution of the Work, and for all risks of every description connected with the prosecution of the Work, until its final acceptance by the Owner, also for all expenses incurred by, or in consequence of, the suspension or discontinuance of the said prosecution of the Work as herein specified, and for all actual or alleged infringements of patent, trademark, or copyright, and for completing the Work and the whole hereof, in an acceptable manner, according to the Plans, Specifications, and other Contract Documents. The payment of any partial or final estimate shall in no way or in no degree prejudice or affect the obligation of the Contractor, at his own cost and expense, to renew or replace all defects and imperfections, or damages. The Architect/Engineer shall be the judge, and the said Contractor shall be liable to the Owner for failure so to do.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

NOT USED.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work of this Section includes:
   1. Requests for Interpretation or for information
   2. Administration of subcontracts
   3. Communication and coordination requirements

B. Site staffing requirements for the Contractor's superintendent are also specified herein, the costs for which shall be included in the Contract price.

1.02 REQUEST FOR INTERPRETATION OR INFORMATION

A. The Contractor shall use the Request for Interpretation/Information Form included within this Section when the Contractor feels that additional information is needed to perform the work of the Contract.

B. The Architect/Engineer will respond to requests utilizing the form provided herein.

C. The Architect/Engineer's verbal response(s) to the Contractor's formal requests, if provided, shall not constitute an official response and if acted upon by the Contractor are done so at the Contractor's own risk and liability and shall not be subject to claims for additional compensation.

D. A signed facsimile of the form will be accepted. The original of the form must be signed and provided to the project manager.

E. The Architect/Engineer will respond in writing to the request as soon as possible.

1.03 DAILY CONSTRUCTION REPORTS

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

1.04 SUBCONTRACTOR ADMINISTRATION AND COORDINATION

A. Terms and conditions of the Contract shall be binding upon each subcontractor.

B. Furnish each subcontractor and major equipment vendor at least one (1) copy of the Plans and Technical Specifications.

C. Provide at least one (1) copy of each approved shop drawing to each subcontractor whose work may depend upon the contents of the shop drawing submittal. The Owner reserves the right to stop all work, without claims for delay, until such time as appropriate subcontractors are furnished with appropriate shop drawings.

D. Each Contractor shall sequence and schedule the work of subcontractors. Coordinate construction and administration activities of subcontractors. The Architect/Engineer and Owner will not accept

telephone calls, facsimiles or office visits from any subcontractors on the project. Subcontractor and vendor questions and clarifications shall be directed to the Architect/Engineer by the Contractor.

E. The Contractor's on-site project superintendent shall inspect all the work of all of his/her subcontractors, as it is being constructed. The Contractor's subcontractor shall not be permitted to do any work on the site without the Contractor's job site superintendent also being there to inspect the work as it is being performed.

1.05 UTILITY COORDINATION

A. Comply with the requirements of 16 NYCRR Part 753 - Protection of Underground Facilities. Submit a letter stating the case number.

B. Comply with the utility coordination requirements contained in the General Conditions.

1.06 PUBLIC/PRIVATE UTILITIES

A. Notify all public and private utilities in accordance with Article 20, Section 322-a of the New York State General Business Law for location and markout of existing utilities in the vicinity of the work.

B. Repair all utilities damaged during the Work to the standards and approval of the respective utility at no cost to the Owner.

1.07 CONTRACTOR'S JOB SITE SUPERINTENDENT

A. Each Contractor shall employ an on-site superintendent as specified herein below. He/She shall be a full-time employee of the Contractor.

B. Each Contractor shall name the job site superintendent within five (5) days of the Notice To Proceed. A letter to the Architect/Engineer shall be provided.

C. He/She shall have the authority to sequence and schedule the work, and to staff the project, so as not to interfere with the work by others and to complete the work daily within the time so required.

D. Each Superintendent shall have a minimum of five (5) years of experience as a job site superintendent for projects of equal size and complexity.

E. Each superintendent shall be qualified to perform the duties so required to successfully complete the work in accordance with the Contract Documents.

F. Each superintendent shall speak English. If required by the Architect/Engineer, provide a resume for the proposed superintendent that shall be typed and shall list the qualifications of the superintendent. Prior to the Contractor assigning a superintendent to the project, he may wish to arrange an interview with the Architect/Engineer to determine the proposed superintendent's ability to properly coordinate the work through the Owner/Architect/Engineer. The Contractor shall employ a superintendent acceptable to the Owner.

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REQUEST FOR INTERPRETATION/INFORMATION (RFI)

OWNER'S NAME: Port Chester Rye Union Free School District

PROJECT NAME & CONTRACT DESIGNATION: Port Chester Middle School Auditorium

CONSTRUCTION CONTRACT NO.: PRSD2414

Product, Item, or System:	
Request Date:	RFI No.:
Specification Section:	Paragraph Ref:
Contract Drawing Reference(s):	
Describe Request:	
Signed:	See Contractor's Attachments for Additional Description for Information
Owner/Architect/Engineer Response:	
Architect/Engineer (Printed):	See Architect/Engineer's Attachments for Additional Information
Architect/Engineer's Signature & Date	*Response Accepted By Contractor* *Contractor's Signature & Date*
The Work shall be carried out in accordance with these supplemental instructions without change in Contract amount or Contract time for completion. Prior to proceeding with these instructions, indicate your acceptance of these instructions by signing where indicated and returning this form to the Architect/Engineer.	

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work of this Section includes the requirements for progress meetings, including but not limited to, the following:
   1. Preconstruction conferences.
   2. Preinstallation conferences.
   3. Progress meetings.
   4. Coordination meetings.

1.02 PRE-CONSTRUCTION CONFERENCE

A. A preconstruction conference will be scheduled before starting construction, at a time convenient to the Owner, Owner's Construction Representative and the Architect, but no later than 15 days after issuance of the Letter of Intent. The conference will be held at the Project Site or another convenient location.

B. Attendees: Authorized representatives of the Construction Manager, Owner, Architect, and their consultants; the Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and be authorized to speak/make decisions, on behalf of the concern they represent, on matters relating to the Work.
   1. Agenda: Discuss items of significance that could affect progress, including the following:
      a. Tentative construction schedule.
      b. Critical work sequencing.
      c. Designation of responsible personnel.
      d. Procedures for processing field decisions and Change Orders.
      e. Procedures for processing Applications for Payment.
      f. Distribution of Contract Documents.
      g. Submittal of Shop Drawings, Product Data, and Samples.
      h. Preparation of record documents.
      i. Use of the premises.
      j. Parking availability.
      k. Office, work, and storage areas
      l. Equipment deliveries and priorities.
      m. Safety procedures.
      n. First aid.
      o. Security.
      p. Housekeeping.
      q. Working hours.

C. Reporting: The Owner's Construction Representative shall set-up the meeting(s), prepare and issue meeting minutes to attendees and interested parties.

1.03 PREINSTALLATION CONFERENCES

A. Contractor shall conduct a pre-installation conference at the Project Site before each construction activity that requires coordination with other construction activities / trade work.

B. Attendees: The Installer and representatives of the Prime Contractor, manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Owner's Construction Representative and Architect of scheduled meeting dates.
   1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for the following:
      a. Contract Documents.
      b. Options.

c. Related Change Orders.
d. Purchases.
e. Deliveries.
f. Shop Drawings, Product Data, and quality-control samples.
g. Review of mockups. Possible conflicts.
h. Compatibility problems.
i. Time schedules.
j. Weather limitations.
k. Manufacturer's recommendations.
l. Warranty requirements. Compatibility of materials. Acceptability of substrates. Temporary facilities.
m. Space and access limitations.
n. Governing regulations. Safety.
o. Inspecting and testing requirements. Required performance results.
p. Recording requirements Protection.

2. Prime Contractor shall record significant discussions, agreements and disagreements of each conference and the approved schedule. Promptly distribute the record of the meeting to everyone concerned, including the Owner and the Architect.
3. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest possible date.
4. Reporting: Prime Contractor or Installer shall issue meeting minutes to attendees, Owner's Construction Representative, Owner and Architect and associated field representatives.

1.04 PROGRESS MEETINGS

A. Progress meetings will be held at the Project Site at regular intervals (typically biweekly) as determined by the Owner's Construction Representative and Architect.

B. Attendees: In addition to representatives of the Owner, Owner's Construction Representative, and the Architect, each Prime Contractor shall be represented at these meetings. Attendance is mandatory at weekly meetings and contractor will include in their bid a sum of $250.00 per meeting (figure 10 meetings) to have an authorized individual in attendance capable of making decisions and providing direction. This amount will be listed as a separate line item on the contractors Schedule of Values. If the contractor misses a meeting without prior written authorization from the Owner's Construction Representative, they will be issued a deduct change order in the amount of $250.00 per occurrence. Subcontractors, suppliers, or other entities will be invited at the discretion of the Owner, Owner's Construction Representative, and the Architect. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.

1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.
2. Review the present and future needs of each entity present, including the following:
   a. Interface requirements. Time.
   b. Sequences.
   c. Status of submittals. Deliveries.
   d. Off-site fabrication problems. Access.
   e. Site utilization.
   f. Temporary facilities and services.

g. Hours of work.
h. Hazards and risks.
i. Housekeeping.
j. Quality and work standards. Change Orders.
k. Documentation of information for payment requests.

D. Reporting: Approximately 5 days after each meeting, Owner's Construction Representative will prepare and distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

E. At least seven (7) calendar days advance notice will be given by the Owner's Construction Representative or the date for the upcoming meeting will be set during the progress meeting.

F. Attendance at progress meetings shall be mandatory. An amount of $1,000 shall be deducted from the Contract Amount for each announced meeting not attended by the Contractor.

G. The owner, a partner, or a corporate officer representing the Contractor shall attend each announced progress meeting. The job site superintendent and office project manager for each Contractor shall also attend.

H. Subcontractors shall attend when requested by the Owner or Owner's Construction Representative at no cost to the Owner.

I. Meetings will be conducted by Owner's Construction Representative at a location selected by the Owner, normally at or adjacent to the project site.

J. The minimum agenda will cover:
1. Review minutes of previous meetings.
2. Identify present problems and resolve them.
3. Plan work progress during next work period.
4. Review the status of off-site fabrication and delivery schedule.
5. Review shop drawings and submittal schedules.
6. Review change order status.
7. Review status of construction progress schedule.
8. Coordinate access requirements.
9. Other business related to the work.
10.

1.05 COORDINATION MEETINGS

A. Conduct project coordination meetings at regular intervals convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.

B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.

C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

D. The Owner's Construction Representative Field Manager will conduct daily meetings with the prime contractors and major subcontractors foremen. The purpose of the meetings is to provide the opportunity for each contractor to communicate to the Field Manager any items relating to their respective construction activity for that day (request for shutdown, deliveries, etc.) The meetings will commence from 7:00 o’clock am until 7:30 o’clock am. These meetings are generally informal. The Owner's Construction Representative Field Manager will keep minutes of these meetings when appropriate and will be available upon request.

1.06 SAFETY MEETINGS

A. Each Contractor will be responsible to conduct their own safety meetings on a regular basis (but not less than four times during any thirty day period.)

B. Minutes of the Safety Meeting must be maintained by each contractor on-site and must be made available upon request. Failure to conduct and submit meeting minutes will be grounds to reject the Prime Contractor's progress payment.

1.07 CONDUCTING MEETINGS

A. General - This paragraph covers Owner, Owner's Construction Representative, and Architect meetings with Contractor and/or his subcontractors. Neither the Owner nor the Owner's Construction Representative nor the Architect wish to meet solely with a subcontractor and requests for such meetings will be discouraged. If a meeting is deemed necessary, every effort will be made to have Contractor attend. If, for some reason, circumstances do not allow such, the meeting may be held, minutes of the meeting will be sent to contractor and decisions on any major questions will be reserved until contractor has been consulted. Subcontractors may accompany contractor to meetings provided the contractor notifies the Owner's Construction Representative in advance.

B. Chairman - When Owner's Construction Representative/Owner attend meetings, the Owner's Construction Representative, or his duly authorized representative, will act as chairman. Should Owner-Contractor meetings be necessary, Owner will chair such meetings.

C. Notices - Owner's Construction Representative or Owner will issue notices of meetings to all parties concerned and will note, thereof, who must attend and who may attend if they so desire. When a Contractor desires a formal meeting, make a request through Owner's Construction Representative. Except when Owner's Construction Representative determines that a prompt meeting is essential, all notices will be issued at least one week in advance of the meeting date.

D. Agenda - All parties shall inform Owner's Construction Representative of items desired to be discussed and Owner's Construction Representative will notify all parties of all items to be considered. This is to allow each party to fully prepare for the meeting. This shall not be construed to mean that other items cannot be brought up at the meetings.

E. Time Limits - It is the intent to hold productive and efficient meetings and to keep them as short as is reasonably possible. The Chairman will be the sole judge as to whether or not further discussion on any matter is warranted and all discussions shall cease when he so orders.

F. Minutes - Minutes of meetings will be kept, written and distributed by the Chairman or his duly authorized representative. Minutes of all meetings will be available upon request to the Chairman.

G. Conduct - It is the intent to conduct all meetings in an orderly manner, to reasonably discuss all items and to hear and observe the rights and opinions of all parties. The Chairman will allow each party to speak, however, he reserves the right to order any individual to leave the meeting at any time for any reason.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section specifies the requirements for preparing construction schedules and for keeping them up to date.

1.02 CONSTRUCTION SCHEDULE - GENERAL

A. The Contractor shall develop a full schedule, in sufficient detail and clarity of for and technique so that the contractor can plan and control his work properly and the Owner's Construction Representative, Owner, and Architect can each readily monitor and follow the progress for all portions of the work. The Contractor shall complete the detailed schedule within 10 days after contract award.

B. In no case shall first application for payment be approved prior to submission of acceptable preliminary schedule, detailed submittal schedule, and schedule of values.

C. Monthly updates, required schedules and graphics shall be submitted to the Owner's Construction Representative/Owner within five working days following the end of the preceding month. Monthly updates, schedules and graphics shall be submitted in five copies.

D. If any of the required submissions are returned to the Contractor for corrections or revisions, they shall be resubmitted within ten (10) calendar days after the return mailing date. Re-submittals shall be in the same quantities as noted above. Review and response by the Owner's Construction Representative/Owner will be given within (10) calendar days after resubmission.

E. The schedule shall comply with the various limits imposed by the scope of work any by any contractually intermediate milestone dates and completion dates included in the contract.

F. The activities identified in the schedule shall be analyzed in detail to determine activity time durations in units of whole working days. All durations listed shall be the result of definitive manpower and resource planning by the Contractor. The contractor will provide specific manpower loading information / crew size to support the duration proposed. (e.g. - 4 man crew can produce 1000 sq. ft. / day, project has 11,000 sq. ft., thus duration is identified as 11 days)

G. 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 site into logical modules or blocks and levels.
   2. Responsibility: Contractor or subcontractor responsible for the work.
   3. Specifications: CSI format - 48 Division.
   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 listed on the approved Schedule of Values.

H. Coordinate the work and maintain the construction schedule. In the event actual progress begins to lag the schedule, promptly employ additional means and methods of construction to make up the lost time.

I. Keep the construction schedule current and revise and resubmit as often as necessary to accurately reflect the conditions of the work, past progress and anticipated future progress.

J. The construction schedule shall be completed, submitted, and deemed received by the Architect/Engineer prior to the first payment application.

K. The schedule, when approved by the Owner's Construction Representative, Owner, and Architect, shall establish the dates for starting and completing work for the various portions of the Contract. It shall be the duty of the Contractor to conform to his/her own schedule and to perform the work within the time limits indicated. Failure to adhere to the approved schedule may expose the Contractor to disputes, claims and additional costs incurred by others.

L. Coordinate letting of subcontracts, material purchases, shop drawing submissions, delivery of materials, and sequence of operations, to conform to the schedule.

M. Coordinate the construction schedule with the proposed schedules of the equipment suppliers and subcontractors.

N. The schedule shall show the critical sequence items where new units must come online before existing facilities go offline, if applicable to the project. The schedule shall also show, in detail, the proposed sequence of the work and the estimated date of starting and completing each stage of the work in order to complete the project within the contract time.

O. The schedule shall be plotted out in color and shall be 11-inch by 17-inch. It shall contain as many sheets as are necessary to show all rolled down tasks. Partially printed schedules will not be accepted. Each Contractor shall arrange to have it plotted on a color plotter suitable for the intended application.

P. Prepare the schedule in a manner so that the actual progress of the work can be recorded and compared with the expected progress.

Q. The schedule shall use the following convention:
   1. Tasks for the General Contractor in blue ink.
   2. Task links/task dependency in blue ink.
   3. Work by others in green ink.
   4. Milestone dates (zero duration) by a red diamond.
   5. The end date for each task and subtask at the end of a bar.
   6. The description of all major tasks within the bar. The bar shall be red.
   7. Critical path.

R. The construction schedule shall also show the following:
   1. Critical sequence items where new units must come on-line before existing facilities go off-line, if applicable to the project.
   2. Computer delivery, if so specified elsewhere.
   3. Telephone service and high speed internet cable installation.
   4. Lead time for control panels that are packaged as systems.

1.03 REPORTS

A. For initial submittal and each update the contractor shall prepare the following standard report:
   1. Tabular Schedule Report sorted by Activity code and Early Start.

1.04 GRAPHICS

A. For initial submittal the contractor shall prepare the following graphics:
   1. Pure logic diagram (Precedence Format) of all data, not time scaled, grouped by Activity code.
   2. Detailed bar chart sorted by Activity Code with Early Start and Early Finish.
   3. Summary bar chart summarizing by Activity Code with Early Start and Early Finish.

B. For each update the contractor shall prepare the following graphic:
   1. Bar Chart showing work activities with Early Start in the next 40 work-days sorted by Activity Code and Early Start.
   2. Summary Bar Chart summarizing by Activity Code showing progress with Early Start and Early Finish.

C. For each Change Order involving adjustment in the contract time for performance, the contractor shall prepare a pure logic diagram showing the changed work with all preceding (predecessors) and succeeding (successors)activities (fragnet schedule).

1.05 SUBMITTALS

A. In no case shall first application for payment be approved prior to submission of acceptable preliminary schedule, detailed submittal schedule, and schedule of values.

B. Monthly updates, required schedules and graphics shall be submitted to the Owner's Construction Representative and Owner within five working days following the end of the preceding month. Monthly updates, schedules and graphics shall be submitted in five copies.

C. If any of the required submissions are returned to the Contractor for corrections or revisions, they shall be resubmitted within ten (10) calendar days after the return mailing date. Resubmittal shall be in the same quantities as noted above. Review and response by the Owner's Construction Representative and Owner will be given within (10) calendar days after resubmission.

1.06 PAYMENT WITHHELD

A. If the Contractor fails to submit the required schedule information as indicated in this section within the time stipulated or provide revision(s) thereof within the requested time, the Owner and Owner's Construction Representative may withhold approval of Progress Payment Estimates until such time as the Contractor submits the required information.

1.07 REVISION OF PROJECT PROGRESS SCHEDULE

A. The Contractor shall evaluate and provide updated construction schedules monthly in accordance with job requirements. Each update shall be submitted to the Owner and Owner's Construction Representative for information purposes and be provided by the last Friday of every month

B. The Contractor shall modify its construction schedule to accommodate coordination of the construction contracts by the Owner/Architect/Engineer without claims for additional compensation or delay.

C. The Owner's Construction Representative will provide an electronic version of the Final Combined Construction Schedule for use in keeping the schedule up to date.

D. From time to time, and at stages deemed appropriate by the Owner's Construction Representative, the Owner may issue updated schedules to reflect the project's status. The percent complete for each task may be shown, as determined by the Owner's Construction Representative.

1.08 UPDATES

A. Updates of the Schedule shall be made at the end of each month reflecting actual or reasonably anticipated progress as of the last working day of the month. Monthly updates of the Detailed Schedule will be made each month until all work is substantially complete.

B. The Contractor will meet with the Owner's Construction Representative and Owner at the end of the updated period to review information in draft form before preparation of the required schedules and graphics. The Contractor will present data, prepared in advance, for review and approval of the Owner's Construction Representative and Owner including :
   1. Actual Start Dates.
   2. Actual Completion Dates.
   3. Activity percent complete and/or Remaining Duration.
   4. Revised logic, changes in activity duration's or resource assignments.
   5. Narrative report discussing progress through the update period; changes, delays or other circumstances affecting progress; status of the project with respect to completion schedule; and any efforts by the Contractor to improve progress.

C. The update meeting will establish the values to be submitted for payment and will be directly related to the schedule of values in the application for payment.

D. The Contractor shall prepare a report of the meeting and make all changes, additions or corrections to the data resulting from the review. The contractor shall promptly prepare the monthly submittal following the update meeting.

1.09 CHANGES, DELAYS AND EXTENSIONS OF TIME

A. When changes or delays are experienced, the Contractor shall submit to the Owner's Construction Representative and Owner, a Time Impact Analysis (TIA) illustrating the influence of each change or delay on the currently scheduled Contract completion date. Each Time Impact Analysis shall include a Fragnet (network analysis) demonstrating how the Contractor proposes to incorporate the change or delay into the Detailed Schedule. Additionally, the analysis shall demonstrate the time impact based on the date the change was given to the Contractor, the status of construction at that point in time, and the activity duration of all affected activities. The activity duration used

in this Time Impact Analysis shall be those activities included in the latest update of the Detailed Schedule, closest to the time of delay or as adjusted by mutual agreement.

B. Each TIA 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 TIA 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 TIA by the Owner's Construction Representative and Owner shall be made within fourteen (14) calendar days after receipt of the TIA unless subsequent meetings and negotiations are necessary. Adjustments in the Contract time for performance shall be made only by written change order approved by the Owner. Upon approval of the Owner, Fragnets illustrating the influence of changes and delays shall be incorporated into the Detailed Schedule by the contractor during the first update after agreement is reached.

C. The time difference between the Early Finish date and the Late Finish Date is defined as "float." The "float" belongs to the Project and may be used by the Contractor or the Owner's Construction Representative and Owner to benefit the Project. Changes or delays that influence activities in the network with "float" and do not extend the Critical Path (the network of activities with zero days "float") shall not be justification for an adjustment in Contract time for performance.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section specifies the requirements for making submissions for the project. Electronic submissions will be required unless expressly noted otherwise.

B. Refer to Section 013216 - Construction Schedule for the requirements concerning the submission of construction schedules and for making updates thereto.

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

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

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

1.02 DEFINITIONS

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

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

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

1.03 IDENTIFICATION OF SUBMITTALS

A. Each and every submission shall be provided by the Contractor and shall be accompanied by a SUBMISSION TRANSMITTAL FORM. The Contractor shall use the specimen form made a part of this Section. *Submittals not containing the form will be returned to the Contractor un-reviewed.*

The Architect/Engineer will not review project submissions until such time as the form is competed in its entirety. Identify each submittal and resubmittal using the form.

B. Each individual submittal shall be identified with a 'submission log number' as specified here in this example: 033000-01-1
   1. The Section number for which the submittal applies, shall be indicated, "033000".
   2. The submittal within the Section shall be indicated by the next grouping "01". For instance and in this example, the concrete design mix may be submission "01", the waterstop catalog cut may be "02", and so on. Submittals shall be sequentially numbered within the Specification Section, i.e. 01, 02, etc.
   3. The number of times the submission was made shall be preceded by a dash and a numerical suffix as follows: "-1". In this example, the concrete design mix is being submitted for the first time. Use the number "1" for the first time it is being submitted.
   4. Subsequent submissions of the concrete design mix shall utilize the original number and a sequential numeric suffix, i.e. "2" for a resubmission, "3" for the second resubmission, and so on. Substitute the new number for the original "1".

C. Where a layout drawing, containing different elements of the project, is being submitted and there is a question as to what the log number might be, then the Contractor shall contact the Architect/Engineer so that an agreed upon log number can be assigned.

D. It is incumbent on the Contractor to initially assign the submission log number designation to each submission. Submissions not containing a log number, as specified above, will be returned to the Contractor un-reviewed by the Architect/Engineer.

E. Every submittal shall also be accompanied by a Transmittal Letter (or "Speed Form") addressed to the Architect/Engineer's Project Manager as hereinafter defined.

1.04 SUBMITTAL SCHEDULE

A. Submittals must be prepared and transmitted as follows, unless otherwise approved by the Owner's Construction Representative:
   1. Within 15 working days after Notice to Proceed:
      a. Doors & Hardware.
      b. HVAC units.
      c. Ductwork shop drawings
      d. Electrical fixtures and panels.
      e. Asbestos Abatement submittals & Plan.
   2. If the contractor misses the milestone submittal timeframes listed above, the owner / agents can withhold requisition payments until the required paperwork is received. If there are any open submittals beyond 60 days of contract award, the owner may withhold contractor payments until all required paperwork is received.
   3. Upon approval by the Owner's Construction Representative, non-critical submissions may be transmitted after the above time frame.
   4. Prepare submittals including information in accordance with Submittal Identification and Procedures specified in this section.

1.05 COORDINATION OF SUBMITTALS

A. Prior to submitting to the Owner's Construction Representative, fully coordinate all interrelated work. <> As a minimum, do the following:
   1. Determine and verify all field dimensions and conditions by field measuring existing conditions and the installed work of this Contract and work by others.
   2. Coordinate with all trades, subcontractors, vendors, system and equipment suppliers and manufacturers, public agencies, and utility companies and secure all necessary approvals, in writing.

B. Make submittals in groups containing all associated items that in some way depend upon each other.

1. This also applies to color charts, as one color may not be able to be selected without the selection of other colors so as to form a color-coordinated group.
2. The Owner's Construction Representative may elect not to review partial or incomplete submissions, whereupon he will notify the Contractor of the additional submissions that are required before a review can be made.

1.06 TIMING OF SUBMITTALS

A. Make submittals far enough in advance of scheduled dates of installation to provide time for reviews, for securing necessary approvals, for possible revisions and re-submittals, and for placing orders and securing delivery. The Architect/Engineer will review submittals in a manner as expedient as possible, and will generally send a written response to the Contractor within seven (7) calendar days of receipt of submittals.

B. Submissions may be returned reviewed, unreviewed, rejected, returned conditioned upon submission of related items, or for other reasons set forth in the Contract Documents.

C. Make submissions well in advance as the returning, rejecting or disapproval of submissions or other similar circumstances are possible and are deemed "avoidable delays". Costs for these delays or those attributed to Contractor's tardiness in making submittals shall be borne by the Contractor.

D. ***All*** submittals requiring Owner's Construction Representative's review (except operations manuals) as required under the technical specifications of these documents shall be submitted within **FORTY FIVE (45)** consecutive calendar days after the date of the Notice to Proceed. An amount of **$250** per calendar day shall be deducted from payment due the Contractor for ***each*** day that an outstanding submittal exists, said amount being the cost associated with the Owner's Construction Representative's review.

E. Operation and maintenance manuals shall be submitted at least **FORTY FIVE (45)** consecutive calendar days prior to scheduled startup of the unit or system.

F. If material or equipment is installed before it has been deemed to be in general compliance with the Contract Documents, as determined by the Owner's Construction Representative, the Contractor shall be liable for its removal and replacement at no extra charge and without an increase in contract time.

1.07 DESTINATION OF SUBMITTALS

A. Each submission of documents shall be accompanied by a transmittal form containing the name of the project, the contract name, the Architect/Engineer's project manager, a submittal ID number, and a description of content for the submitted items.

B. A copy of the TRANSMITTAL FORM shall also be provided to the Owner's Construction Representative's inspector at the job site.

C. Electronic submittals shall be transmitted through the Newforma® Project Center website; a Submittal Exchange website or by email; pending instruction by the Architect/Engineer. H2M architects + engineers is using a project information application called Newforma® Project Center. One of its components is Newforma Info Exchange, a web application that facilitates sending and sharing transmittals, and file sharing.

D. As an external team member on this project the Contractor will be required to access the H2M architects + engineers/Newforma Info Exchange website for information related to the project, including file transfers, RFI, Submittals, Action Items, and project Calendar information. The Contractor will have access to this website using any internet-capable computer running Internet Explorer or Firefox. All data transmitted through the H2M architects + engineers/Newforma Info Exchange website is encrypted and logged. Further instructions will be provided to the Contractor after the contract is awarded.

E. Other submissions, such as material samples or other items as instructed by the Owner's Construction Representative, shall be sent to the Architect/Engineer's office as follows:

H2M architects + engineers
1133 Westchester Avenue, Suite N-210

Attention: H2M Project Manager (Named at Pre-Construction Conference or in the Notice to Proceed)

1.08 CLARITY OF SUBMITTALS

A. All printed materials shall be neat, clean, professionally drafted by hand or by computer, clear, legible, and of such quality that they can be easily reproduced by normal photocopying or wide format copy/print machines.

B. All electronic submittals shall be produced with a minimum resolution of 300 dpi.

C. Binders of information shall be separated into groups, subsystems, or similar equipment/function. Copies not conforming to this paragraph will be returned to the Contractor without the Owner's Construction Representative's review.

1.09 CONTRACTOR'S REPRESENTATION

A. By making a submission, the Contractor represents that he has determined and verified all field measurements and dimensions, field construction criteria, site and building constraints in terms of limitations in moving equipment into an enclosed space, materials, catalog and model numbers and similar data and that he has checked and coordinated each submission with other work at or adjacent to the project site in accordance with the requirements contained in Section 013100 - SPECIFICATION COVER and the Contract Documents.

B. Every SUBMISSION TRANSMITTAL FORM shall contain the Contractor's approval stamp and date showing that the submittal has been approved by the Contractor. The Owner's Construction Representative will not review submittals that have not yet been reviewed and approved by the Contractor.

1.10 ENGINEER/ARCHITECT'S REVIEW

A. Owner's Construction Representative will review and comment on each submission conforming to the requirements of this Section.
   1. Architect/Engineer's review will be for conformance with the design concept of the project and will be confined to general arrangement and compliance with the Contract Documents only, and will not be for the purpose of checking dimensions, weights, clearances, fittings, laying lengths, tolerances, interference's, for coordinating the work by others or subcontractors.
   2. The Architect/Engineer's review of a separate item, or portion of a system, does not represent a review of an assembly or system in which the item functions.

B. The Architect/Engineer will mark submittals as follows:
   1. NO EXCEPTION TAKEN (**A**) - No corrections, no marks. The content of this submittal has been reviewed by the Architect/Engineer and been found to be in general compliance with the Contract Documents. No further submission of this submittal is required and the information contained in the submittal may be built into the work in accordance with the Contract Documents.
   2. MAKE CORRECTIONS NOTED (**B**) - Minor amount of corrections. The content of this submittal has been reviewed by the Architect/Engineer and has been found in general to be in compliance with the Contract Documents. The notations made on the submittal by the Architect/Engineer shall be incorporated into the work in accordance with the terms and conditions of the Contract Documents. No further submission of this submittal is required.
   3. AMEND AND RESUBMIT (**C**) - The content of this submittal has been reviewed by the Architect/Engineer and this review has determined that additional data and/or modification to the submitted data or other changes are required to bring the work represented in this submittal into compliance with the Contract Documents. This submittal shall be reviewed and revised in accordance with the Architect/Engineer's comments and resubmitted to the Architect/Engineer for review. The information contained on the resubmittal shall not be incorporate6d into the work until the submittal is returned to the Contractor marked "NO EXCEPTION TAKEN" or "MAKE CORRECTIONS NOTED".

4. REJECTED (**D**) - The content of this submittal has been reviewed by the Architect/Engineer and has been determined not to be in accordance with the requirements contained in the Contract Document and requires too many corrections or other justifiable reason. The submittal shall be corrected and resubmitted or a submittal of an alternate shall be provided. No items are to be fabricated under this mark.
5. SUBMIT SPECIFIED ITEM (**E**) - The content of this submittal has been reviewed by the Architect/Engineer and this review has indicated that the work displayed in the submittal is not in compliance with the Contract Documents. The Contractor shall submit another submittal for this portion of the work, which complies with the Contract Documents.
6. RECEIVED (**R**) - This submittal is accepted on the project and filed for record purposes only, in accordance with the terms and conditions of the Contract Documents. Documents marked "RECEIVED" will not be returned.

C. No payment will be made on any item for which a submission is required if such submission:
   1. has not been made,
   2. has been made but was not stamped "No Exceptions Taken" by Architect/Engineer,
   3. has been made and stamped "Make Corrections Noted", but contractor has not complied with Architect/Engineer's notes marked on the submittal,
   4. has been made and stamped "No Exceptions Taken", but item provided does not conform to the shop drawing nor to the Contract Documents.

D. Submittals not required by these specifications will not be recognized or processed.

E. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for re-submittals.
   1. Allow between 10 and 15 business days for initial review of the first round of submittals. Allow additional time if the Architect must delay processing to permit coordination with subsequent submittals.
   2. If an intermediate submittal is necessary, process the same as the initial submittal. Allow an additional 10 business days for processing each submittal.
   3. No extension of Contract Time will be authorized because of contractor's failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

1.11 RESUBMISSIONS

A. Prepare new and additional submissions, make required corrections, and resubmit corrected copies until found in compliance with the Contract Documents.

B. On, or with, re-submittals, clearly describe revisions and changes made, other than the corrections requested by Architect/Engineer, which did not appear on the previous submissions.

1.12 CONTRACTOR'S RESPONSIBILITIES

A. Architect/Engineer's review of submittals shall not relieve the Contractor of his/her responsibility for any deviation from the requirements of the Contract Documents nor relieve the Contractor from responsibility for errors or omissions in the submittals.

B. No portion of the work requiring a submission shall be commenced until the Architect/Engineer has found the submission in general compliance with the Contract Documents.

C. The Contractor shall provide written notification of any specification or drawing deviation.

1.13 EXCESS COSTS FOR ENGINEERING/ARCHITECTURAL SERVICES

A. The Owner will charge to the Contractor, and will deduct from the partial and final payments due the Contractor, all excess engineering and architectural expenses incurred by the Owner for extra services (work) conducted or undertaken by the Architect/Engineer as stipulated below:
   1. Services and other similar charges because of the Contractor's errors, omissions, or failures to conform to the requirements of the Contract Documents as related to administrative charges associated with non-compliance with the requirements for making project submissions.

2. Services and other similar charges required to examine and evaluate any changes or alternates proposed by the Contractor and which may vary from the Contract Documents.
3. Services and other similar charges as a result of the Contractor's proposed substitution of materials, equipment or products which require a redesign of any portion of the project, as contained in the Contract Documents at the time of bid.
4. Services and other similar charges as a result of the Contractor's proposed substitution of products which require an engineering and/or architectural evaluation, beyond the time stipulated in Section 012500 - PRODUCT SUBSTITUTION PROCEDURES, to determine if the substituted product is equal to that specified.
5. Services and other similar charges as a result of changes by the Contractor to dimensions, weights, sizes, voltages, phase, horsepower, materials of construction, and similar physical or operating characteristics of the product furnished which require redesign of the project in any way.
6. Services and other similar charges for the review of resubmissions of shop drawings that have been marked as "No Exceptions Taken" or "Make Corrections Noted".
7. Services and other similar charges for the review of shop drawings submitted more than two (2) times for the same product or portion of the work.

1.14 MISCELLANEOUS SUBMITTALS

A. Provide a Submittal Schedule within seven (7) calendar days from the date of the Notice to Proceed. The Submittal Schedule shall list all submittals for the project referenced by draft log number. Provide the estimated date that the submittal will be transmitted to the Architect/Engineer for review.

B. Within seven (7) calendar days from the date of the Pre-Construction Meeting, submit a Proposed Products List. This list shall be a complete listing of all products proposed for use, with name of manufacturer, service headquarters, trade name and model number of each product. Partial listings will not be accepted.

C. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.15 SUBCONTRACTOR LIST

A. The Contractor shall submit, on AIA Form G705, within FIFTEEN (15) calendar days after the date of the Notice to Proceed, a list of all subcontractors, including the names of the major subcontractors that were submitted at the time of the bid.

B. Indicate M/WBE subcontractors in accordance with the requirements contained in other portions of the Project Manual.

1.16 MATERIAL SAFETY DATA SHEETS (MSDS)

A. Comply with "Right to Know" requirements of Chapter 551 of Laws of New York, 1980, concerning notification of the use of toxic substances.

B. Any product or substance used by the Contractor or its subcontractors which is listed in Subpart Z of OSHA Part 1910 Title 29 of the Code of Federal Regulations entitled "Toxic and Hazardous Substances" shall be identified to the Owner/Architect/Engineer by the Contractor's submission of a standard Material Safety Data Sheet (MSDS) in accordance with "Right To Know" requirements.

C. Products will not be permitted to be kept on site without a MSDS.

1.17 SHOP DRAWINGS

A. Submit shop drawings for all fabricated work, for all manufactured items and for items specifically required by the specifications.

B. Subcontractors shall submit shop drawings directly to the Contractor for checking. Thoroughly check subcontractors' shop drawings for measurements, sizes of members, details, materials, and conformance with the Contract Documents.
   1. Return submittals which are found to be inaccurate or in error.

2. Do not submit to the Architect/Engineer until all corrections have been made.

C. Clearly show the relationship of the various parts of the project and where the information provided on the submission depends upon field measurements and existing conditions.

D. The Contractor shall make all measurements, confirm existing conditions, and include them on the shop drawings before making a submission to the Architect/Engineer.

E. Submissions for a single item, or group of related items shall be complete.

F. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

G. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

H. When submitting manufacturers' catalogs, pamphlets or other data sheets, in lieu of prepared shop drawings, clearly mark the items being submitted for review.

I. If the shop drawings contain any departures from the contract requirements, specifically describe them in the letter of transmittal.
   1. Where such departures require revisions to layouts, structural, architectural, electrical, HVAC or any other changes to the work as shown, Contractor shall, at his own expense, prepare and submit revised drawings accordingly.
   2. Make drawings the same size as the Contract Drawings and to the same scale.

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

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

1.18 SAMPLES

A. Where required, or where requested by the Architect/Engineer, submit sample or test specimens of materials to be used or offered for use.
   1. Samples shall be representative, in all respects, of the material offered or intended, shall be supplied in such quantities and sizes as may be required for proper examination and tests, and shall be delivered to Architect/Engineer, prepaid, along with identification as to their sources and types of grades.
   2. Submit samples well in advance of anticipated use to permit the making of tests or examinations.

B. Samples will be checked for conformance with the design and for compliance with the Contract Documents.

C. Work shall be in accordance with the approved sample. The use of materials or equipment for which samples are requested or required to be submitted is not permitted until such time that the Architect/Engineer has completed his review.

1.19 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Architect/Engineer.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation. Provide manufacturer's instructions with shop drawings.

1.20 CERTIFICATIONS

A. Submit certifications of compliance indicated in the Contract Documents.

B. Certifications shall be complete and exact, they shall be properly authenticated by the written signature, in ink, of an owner, officer or duly authorized representative of the person, firm or organization issuing such certification and they shall guarantee that the materials or equipment are in complete conformance with the requirements of these specifications.

1.21 COLORS AND PATTERNS

A. Unless the precise color and pattern are specified, whenever a choice of color or pattern is available in a specified product, submit accurate color and pattern charts for Architect/Engineer's and Owner's review and selection.

1.22 MANUFACTURER'S SERVICE CENTER

A. The product of a manufacturer who does not maintain an adequate nearby service center and a sufficient stock of spare parts are subject to rejection by Architect/Engineer solely on that basis.

B. With each submission, submit information on manufacturer's facilities and give complete details of his service policies and capabilities, and a general idea of the stock of spare parts available. Submit this information in the form of a certification. Also include names, addresses and telephone numbers of at least three of the service center's present customers who are in the area of the project.

1.23 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Distribution: It is the contractor's responsibility to coordinate submittals with each subcontracting trade. Each contractor shall be required to provide their subcontractors with a complete list of their submittals in order that other contractors can request required submittal information.

1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

1.24 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report recording the following information concerning events at the site, and submit one copy to the Architect and one copy to the Owner's Construction Representative by 10:00 a.m. the following day. Any contractor not submitting required reports will not receive approval ‹n the subsequent application for payment until such time that all required information is submitted

1. List of subcontractors at the site.
2. Count of personnel at the site (substantiates payroll).
3. High and low temperatures, general weather conditions.
4. Accidents and unusual events.
5. Meetings and significant decisions.
6. Stoppages, delays, shortages, and losses.
7. Meter readings and similar recordings.
8. Emergency procedures.
9. Orders and requests of governing authorities.
10. Change Orders received, implemented.
11. Services connected, disconnected.
12. Equipment or system tests and startups.
13. Partial Completions, occupancies.

14. Substantial Completions authorized.

1.25 TEST RESULTS AND INSTALLATION

A. Whenever field startup services are specified, the Contractor shall obtain from the manufacturer and submit to the Architect/Engineer Manufacturer Startup Reports (MSR's). The report shall detail the results of the field visit and all special conditions resulting from the startup.

B. Whenever field or factory tests are required on materials, equipment and systems, such tests shall be performed and the test results submitted to Architect/Engineer in the form of a MSR.

C. Do not deliver to the project or incorporate into the work any materials or equipment for which Architect/Engineer has not completed his review and found same to be in general conformance with the Contract Documents.

D. Submit MSR's within thirty (30) calendar days after the date of the startup or factory test.

1.26 SPARE PARTS LIST

A. Prepare a list of all spare parts specified to be provided in other Sections. Compile the total list for the purposes of reviewing actual spare parts delivered versus spare parts specified to be provided. The list shall reference the Section, model number, and quantity to be provided.

1.27 WAIVER OF CERTAIN SUBMITTAL REQUIREMENTS

A. Unless otherwise specified, the requirement to submit data and samples for products specified for approval will be waived for products specified by brand name if the specifically named products are furnished for the work. In such cases, the Contractor shall submit two (2) copies of required Product Data directly to the Architect/Engineer's field representative for information and verification during its incorporation into the work. The SUBMISSION TRANSMITTAL FORM shall always be used.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

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CONTRACTOR'S COMPANY NAME
ADDRESS

SUBMISSION TRANSMITTAL FORM

CLIENT NAME: Port Chester Rye Union Free School District
PROJECT TITLE: Port Chester Middle School Auditorium

H2M PROJECT NO.: PRSD2414

Product, Item, or System Submitted:			
Submission Date:		Submission Log No.:	
Specification Section:		Paragraph Reference:	
Contract Drawing Reference(s):			
Manufacturer's Name:			
Manufacturer's Mailing Address:			
Manufacturer's Contact Information:	*Name*	( ) *Tel. no.*	*Email*
Supplier's Name:			
Supplier's Mailing Address:			
Supplier's Contact Information:	*Name*	( ) *Tel. no.*	*Email*
This item is a substitution for the specified item:		____ No	____ Yes
Contractor's Approval Stamp with Signature & Date		Contractor's Brief Comments or Remarks (attach separate letter as needed): By making this submission, we represent that we have determined and verified all field measurements and dimensions, field construction criteria, site and building constraints in terms of limitations in moving the item into the enclosed space, materials, catalog and model numbers and similar data and that we have checked and coordinated this submission with other work at or	

	adjacent to the installed location in accordance with the requirements contained in the Contract Documents.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Codes

B. Governing agencies

C. Permits

1.02 CODES

A. Comply with the requirements of the various codes referred to in these Specifications. Such codes shall be the date of the latest revision in effect at the time of receiving bids.

B. If there is a conflict between local, state, and/or Federal regulatory requirements, seek a consultation with the State Department of Labor. Resolve conflicts to the satisfaction of the State Department of Labor prior to commencing work.

C. Electrical Work: Conform to the requirements of the National Electrical Code (NEC) unless otherwise shown or specified. The Owner will be the sole judge of the interpretation of these rules and requirements.

1.03 GOVERNING AGENCIES

A. All work shall conform to and be performed in strict accordance with all governing agencies such as, but not limited to:
   1. Occupational Safety and Health Act - OSHA
   2. State Department of Environmental Conservation
   3. State Building Code
   4. State Fire Code
   5. National Fire Protection Association - NFPA
   6. National Electrical Code
   7. New York State Energy Code
   8. Town Codes, Rules, Laws and Ordinances
   9. Electric Utility
   10. State Education Department

1.04 PERMITS AND INSPECTIONS

A. Representatives of the Owner shall have access to the work for inspection purposes. The Contractor shall provide facilities suitable to the Owner to facilitate inspections of the installed work.

B. Obtain and pay for all permits, fees, licenses, certificates, inspections and other use charges required in connection with the work.

C. Obtain a New York Board of Fire Underwriters inspection and certificate.

D. The following permits and/or certifications will be obtained by the Owner from the appropriate permitting agencies:
   1.

1.05 LISTINGS

A. Equipment and materials for which Underwriters' Laboratories, Inc. (UL) provides product listing service, shall be listed and bear the listing mark. Alternately, ETL Testing Laboratories, Inc. Product Safety Testing Listing is acceptable if the listed product has been tested to the applicable UL Standard.

1.06 FIRE RESISTANT CONSTRUCTION MATERIALS AND ASSEMBLIES

A. Conform to the fire rating classifications based upon the test methods and acceptance criteria in the Standard, Fire Tests of Building Construction and Materials for which Underwriters' Laboratories, Inc. (UL) provides listings.

B. Materials and assemblies shall comply with the acceptance criteria, detailed description of the assembly, its performance in the fire test and other pertinent details such as specification of materials, Classification coverage, and alternate assembly details.

C. Alternatively, fire resistance rating classifications by other issuing organizations listed in the Fire and Building Codes are acceptable.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 ABBREVIATED SUMMARY

A. This Section explains the format of the specifications.

1.02 SPECIFICATION FORMAT

A. The Specifications are generally arranged according to the Construction Specifications Institute (CSI) format. Most of the technical requirements are specified in the technical specifications of the document, which are grouped into forty-eight (48) major divisions. Most of the legal and administrative requirements are included in Division 01, General Conditions, Information For Bidders, and the Contract (agreement).

B. Technical sections are arranged in numerical order, however section numbers may not be consecutive from section to section.

C. Page numbering is subordinate to each section.

D. Most sections are generally broken down into three (3) parts:

1.	PART 1 - GENERAL
2.	PART 2 - PRODUCTS
3.	PART 3 - EXECUTION

E. Not all these parts may be used and in some cases, the title of some of the parts may be different than listed above. Paragraph numbers are subordinate to each part.

F. The Contractor is advised that the format described here is flexible in nature.
   1. There is some overlapping of specified information between various portions of the Specifications.
   2. In all cases, the entire requirements of the Contract Documents for the project shall apply.

G. Explanations:
   1. Many technical sections begin with a paragraph titled "SECTION INCLUDES", "DESCRIPTION", or similar wording.
      a. In these paragraphs, a brief listing of the specified products may appear or a brief description of the work generally specified in that section is presented.
      b. These descriptions or listings are not all inclusive, but merely are provided as an aid in locating subject matter.
      c. In some cases special cost related items of work are called to the attention of the Contractor in these opening paragraphs.
   2. "RELATED SECTIONS" or "RELATED WORK" or similar wording paragraphs list or reference related work specified elsewhere in the Contract Documents. Such listing is not all inclusive, rather, they are merely an aid to the Contractor in locating some of the other Specification Sections wherein work is specified which has a particularly close interrelationship with the work specified in that section.
      a. It shall be understood that all of the Work, and all of the Specifications and other portions of the Contract Documents, are interrelated, and that the total of all requirements set forth in all of the Contract Documents shall be met.
      b. Equipment suppliers and manufacturers shall be advised of the requirements for making submittals and delivering products, as specified in Division 1 sections, even if said sections are not referenced therein that section.

3. "REGULATORY REQUIREMENTS" or "REFERENCES" or similar wording paragraphs describe standards, laws, guidelines, regulations, and standards related to workmanship and installation of the products specified which shall be followed by the Contractor in completing the work specified therein that section as if it was written there in that section. All such requirements and references shall be latest issue in effect at the time of the bid opening.
4. When a "GUARANTEE" or "WARRANTY" paragraph appears in the section it is calling attention to a guarantee which extends beyond the period of the Contractor's Guarantee called for in the administrative portion of the Contract Documents or it states special requirements specific to the equipment, systems or products specified in that section.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work of this Section includes the requirements for pre-installation meetings.

1.02 PRE-INSTALLATION MEETINGS

A. As required in individual specification sections, the Contractor shall convene a pre-installation meeting at the site prior to commencing work of the section.

B. Pre-installation meetings are to be convened at least one week prior to commencing work on the section. The contractor shall arrange and require attendance of Owner's Construction Representative, Owner, and Architect and parties directly affecting, or affected by, work of the specific section.
   1. At least seven (7) calendar days advance notice is to be given.
   2. The contractor shall prepare agenda and preside at meeting. At a minimum the following items are to be discussed:
   3. Review conditions of installation, preparation and installation procedures.
   4. Review coordination with related work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

NYS EDUCATION DEPARTMENT Office of Facilities Planning 89 Washington Avenue, Room 1060 EBA Albany, NY 12234	STATEMENT OF SPECIAL INSPECTIONS AND TESTS As required by the Building Code of NYS (2020 BCNYS) *Note: The code listings below are not to be considered all inclusive.*

BCNYS § 1704.2.3 requires the NYS Licensed Design Professional (of record) to complete the Statement of Special Inspections and Tests. Completion of the Statement of Special Inspections & Tests, **and;** Submission to the Office of Facilities Planning with the Construction Permit Application is a condition for issuance of the Building Permit.

School District	Project Tiltle
Port Chester-Rye Union Free School District	Auditorium Upgrades at Port Chester Middle School
Building	
Port Chester Middle School	
SED Project #	Project Address
661904-03-0013-030	113 Bowman Avenue, Rye Brook, NY 10573
Architect/Engineer:	
Sign and Stamp: 	
A/E Firm (or Dba):	Phone / Date
Kevin Medler H2M Architects & Engineers	631-756-8000 ext. 1304
Comments:	

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
A. Steel Construction				**Ch. 22**		
1. Material verification of high-strength bolts, nuts and washers.		X	AISC 360	1705.2 2204	☑	051200
2. Inspection of high-strength bolting.	X	X	AISC 360 ACI 318	1705.2 2204.2	☑	051200
3. Material verification of **Structural Steel**. **Open Web Steel Joist and Girders.** Basic protection of steel members, **Seismic Resistance**			AISC 360 ASTM A6, A514, A29 SJ100, 200 AICS 341	1705.2 2203, 2205 1705.2 2207	☐ ☐	
4. Spray Applied Fire Resistant Materials & Specialized Finishes			ASTM E605, E736	1705.14 1705.15	☐	
5. **Cold Formed Steel Construction**- load bearing. **Seismic Resistance**			AISI S100, S220, S240 ANSI/SDI -NC1.0, RD1.0, SDI-C, ASCE 7, 8 AISI S400	1704.2.5 2210 2211	☐ ☐	
6. Material verification of weld filler materials.			AWS D1.1, D1.3	1705.2 2204.1	☑	051200
7. Inspection of welding:			ACI 318: 26.6.4	T 1705.3 2204	☐	
a. Structural steel	X	X	AWS D1.1, D1.3	1705.2	☑	051200
b. Reinforcing steel	X	X	AWS D1.1, D1.3	1705.3.1	☐	
c. Cold Formed Steel Deck			AISC S100, ASCE 7, 8	1705.2.2	☑	
8. Inspection of steel frame joint details.		X		1705.2	☑	051200

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.		CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
B.	**Concrete Construction**				**Ch. 19**		
1.	Inspection of reinforcing steel, including prestressing tendons, and verify placement.		X	Ch. 21, 22 ACI 318; Ch 20, 25.2, 25.3, 26.6.1, 26.6.3 AISC 360	T 1705.3 1901 1905	☑	
2.	Inspection of reinforcing steel bar welding.			ACI 318, AWS D1.4	T 1705.3	☐	
3.	Inspection of anchors to be installed in concrete prior to and during placement.	X		ACI 318: 17.8.2, 17.8.2.4	T 1705.3	☐	
4.	Verify use of required design mix.		X	ACI 318: Ch. 19, 26.4.3, 26.4.4	T 1705.3 1904 1908	☑	
5.	Sampling fresh concrete: slump, air content, temperature, strength test specimens.	X		ASTM C172, C31 ACI 318: 26.5, 26.9, 26.10, 26.11	T 1705.3 1901 1905 1908	☑	
6.	Inspection of placement for proper application techniques.	X		ACI 318: 26.5	T 1705.3	☑	
7.	Inspection for maintenance of specified curing temperature and techniques.		X	ACI 318: 26.5	T 1705.3 1908 1909	☑	
8.	Inspection of prestressed concrete.	X		ACI 318: 26.10	T 1705.3	☐	
9.	Erection of precast concrete members.		X	ACI 318: 26.9	T 1705.3	☐	
10.	Verification of in-situ concrete strength prior to stressing of tendons and prior to removal of shores and forms from beams and slabs.		X	ACI 318: 26.11.2	T 1705.3	☐	
11	Inspection of formwork		X	ACI 318: 26.11.1.2 (b)	T 1705.3	☑	

C.	Masonry Construction							Ch. 21
INSPECTION AND TESTING **Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17** **All reports to be submitted to the owners representative for use, approval and record.**		**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**		**BCNYS REFERENCE**	**CHECK IF REQUIRED**	**IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY**
	L1 = Level 1 Inspection required for nonessential facilities. **L2 =** Level 2 Inspection required for essential facilities. * In general, schools are not considered essential facilities unless they are a designated emergency shelter.			ASTM E119 UL 263 ASTM C1364 ASTM C1670 ASTM A706 ASCE 7, 8	TMS 402, 403, 404, 504, 602	1705.4 2101 1604		
1.	Verify to ensure compliance:							
	a. Proportions of site prepared mortar and grout.		**X L1 & L2**			1705.4 2103.2	☐	
	b. Placement of masonry units and construction of mortar joints.		**X L1 & L2**			1705.4 T 1705.3	☐	
	c. Location and placement of reinforcement, connectors, tendons, anchorages.		**X L1 & L2**			1705.45 2103.4 T 1705.3	☐	
	d. Prestressing technique.		**X L1**			1705.4	☐	
	Grout space prior to grouting.	**X L2**				1705.4	☐	
	e. Grade and size of prestressing tendons and anchorages.		**X L1**			1705.4	☐	
	Placement of grout.	**X L2**				1705.4	☐	
	f. Grout specs prior to grouting.	**X L2**				1705.4	☐	
2.	Inspection program shall verify:							
	a. Size and location of structural elements.		**X L1 & L2**			1704.5 1705.4	☐	
	b. Type, size, and location of anchors.	**X L2**	**X L1**			1705.4 T 1705.3	☐	
	c. Specified size, grade, and type of reinforcement.		**X L1 & L2**			1704.5	☐	
	d. Welding of reinforcing bars.	**X L1 & L2**				1704.5	☐	
	e. Cold/hot weather protection of masonry construction.		**X L1 & L2**			1704.5, 2104.3, 2104.4	☐	
	f. Prestressing force measurement and application.	**X L2**	**X L1**			1704.5	☐	
3.	Verification accessory placement prior to grouting:	**X L2**	**X L1**			1704.5, 2105.2.2, 2105.3	☐	
4.	Grout placement.	**X L1**				1704.5	☐	
5.	Preparation of grout specimens, mortar specimens, and/or prisms.	**X L1 & L2**				1704.5, 2105.2.2, 2105.3	☐	
6.	Compliance with documents and submittals.		**X L1 & L2**			1704.5	☐	

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.		CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
D.	**Wood Construction**				**Ch. 23**		
1.	Fabrication process of prefabricated **Wood Structural Elements** and assemblies.		X	Ch. 16 AWC, APA, CPA, DOC PS1, PS2	1704.6, 1705.5 2302, 2303 2304	☐	
2.	High-load diaphrams **Seismic Resistance**		X		1704, 1705, 1704.6 2304, 2305 2306, 2307, 2308	☐	
E.	**Soils**				**Ch. 18**		
1.	Geotechnical Investigations, Excavations, Grading, Fill Damp-proofing/ Water-Proofing		X	ASTM, NYS DOT OSHA Appendix J- BCNYS	1704, 1706 1803, 1804, 1805	☐	
2.	**Flood & Stormwater Hazards** [per BCNYS 106]		X	Local Highway Authority Flood Plain Admin. Appendix G- BCNYS	1703 1610, 1611, 1612 1805.1.2.1	☐ ☐	
F.	**Specialized Foundations- Piers, Piles**				**Ch. 16**		
1.	Deep Foundation Elements: Driven Piles Cast in Place Helical Piles		X		T 1705.7 T 1705.8 1705.7 1705.8 1705.9	☐	
G.	**Exterior Wall Coverings**				**Ch. 14**		
1.	Exterior Insulation and Finish Systems (EIFS) MCM, HPL, Other Combustible Materials		X	ASTM E2568, E2273, E2570 E2393, E84 Ch. 16 NFPA 268, 275, 285, 286	1405, 1406, 1407, 1408 1704.2, 1705.12.5 1705.16	☐	
H.	**Misc.**						
1.	Access Floors and Storage Racks Other Architectural, MEP Components **Seismic Resitance**		X		1705.12	☐	
2.	In-Situ Testing		X		1604.6, 1708		
3.	Pre-Construction Load Testing		X		1604.7, 1709	☐	
4.	Fire Resistant Penitrations & Joints Fire Stops Testing for Smoke Control		X	Ch. 7 ASTM E119 UL 263	1705.17 1705.18	☐	
5.	**Pre-Submission:** **Inventory of all Fire-Resistant-Rated Construction- Level 2 Alterations and greater** [per BCNYS 106]	X		verification required EBCNYS Ch. 3 C. of E. 155 Regulations.	**FCNYS 701.6** **BCNYS 703.7** **19CRR-NY XXXII**	☐	
6.	**Pre-Submission:** **Hazardous Material Survey** **Water Quality Survey**	X X		verification required ACM Letter- Certificate C. of E. 155 Regulations.	US-EPA NYS-DOH	☐	
7.	Other:					☐	

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Asbestos and lead-based paint certification.

B. Moisture control.

1.02 ASBESTOS AND LEAD-BASED PAINT CERTIFICATION

A. Contractor shall submit the enclosed "Asbestos and Lead-Based Paint Certification" upon completion of all work.

1.03 MOISTURE CONTROL

A. The Contractor shall maintain a strict policy and protocol for the control of water infiltration and moisture build-up during the course of the project. The plans and specifications are not intended to depict each and every condition or detail of construction. As the knowledgeable party in the field, the Contractor is in the best position to verify that all construction is completed in a manner which will provide a watertight structure. The Contractor has the sole responsibility for ensuring the watertight integrity of the structure. The Contractor's contractual obligations include, but are not limited, to the following:

B. Water Infiltration: If the Contractor observes water infiltration (unintended) into a completed building or an ongoing construction site, he must immediately report the condition to the Owner and Architect/Engineer, and shall immediately take steps to investigate the source of the water infiltration, identify the responsible party (person who performed work that resulted in water infiltration) and devise a procedure to promptly eliminate water infiltration into the building.

C. Handling of Water-Damaged Building Materials and Construction:
   1. Contractor shall inspect all building materials delivered to the site for pre-existing water damage, as well as existing mold growth.
   2. If in-place construction becomes wet, notify the Owner and Architect/Engineer immediately. The Owner and Architect/Engineer will determine whether or not the work shall be removed and replaced, or if the type of material can be permitted to dry.
   3. Under no circumstances may new or additional construction be placed over, or otherwise enclose, wet building materials.

D. Visible Mold/Mildew:
   1. If the Contractor observes any substance that appears to be mold or other fungal growth and/or an unidentified substance within a completed building or the ongoing construction site, he shall immediately suspend construction operations in the area, and report the condition to the Owner and Architect/Engineer.
   2. No person shall be allowed back into the affected area without permission of the Owner.

1.04 SUBMITTALS

A. Contractor shall submit completed and notarized "Certification of Asbestos and Lead-Based Paint" form.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

This space left intentionally blank.

Certificate of Asbestos and Lead-Based Paint (New Work)	
Client's Name:_____	
Project Location:_____	
Project Address:_____	
Project Name:_____	
Project Number:_____	
CERTIFICATION:	
This Contractor hereby certifies that no asbestos-containing material and lead-based paint, as defined by applicable federal and state regulations, has been furnished or installed at the referenced project:	
Contractor Name:_____	
Signature:_____	
Address:_____ _____	
Telephone:_____	Date Executed: _____
This Form Shall Be Notarized	

END OF SECTION 014536

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities include, but are not limited to, the following:
   1. Drainage.
   2. Water Service and distribution.
   3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
   4. Ventilation.
   5. Electric power service.
   6. Lighting.
   7. Temporary Heating.

C. Support facilities include, but are not limited to, the following:
   1. Waste disposal facilities.
   2. Field offices.
   3. Storage and fabrication sheds.
   4. Lifts and hoists.
   5. Staging areas.
   6. Construction aids and miscellaneous services and facilities.
   7. Scaffolding and platforms

D. Security and protection facilities include, but are not limited to, the following:
   1. Environmental protection.
   2. Stormwater control.
   3. Tree and plant protection.
   4. Pest Control.
   5. Site enclosure fence.
   6. Security enclosure and lockup.
   7. Barricades, warning signs, and lights.
   8. Covered walkways
   9. Temporary enclosures.
   10. Temporary partitions.
   11. Fire protection.

E. Unless work of this section is indicated to be provided under a specific contract, Contractor must provide, maintain and remove required temporary facilities necessary to perform his own construction activities.

F. Accessible Temporary Egress: Comply with applicable provisions in ICC A117.1.

1.02 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
   1. Building code requirements.
   2. Health and safety regulations.
   3. Utility company regulations.
   4. Police, fire department, and rescue squad rules.
   5. Environmental protection regulations.

B. Standards: Comply with NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations,” ANSI A10 Series standards for "Safety Requirements for Construction and Demolition,” and NECA Electrical Design Library "Temporary Electrical Facilities.”
   1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 “National Electric Code."

C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.03 PROJECT CONDITIONS

A. Temporary Utilities: Each contractor will prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-preventive measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

1.04 DIVISION OF RESPONSIBILITIES

A. General: These Specifications assign the Contractor responsibilities.

B. Each Contractor is responsible for the following:
   1. Installation, operation, maintenance and removal of each temporary facility considered as its own normal construction activity, as well as the costs and use charges except as listed below.
   2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
   3. Its own storage and fabrication sheds.
   4. Hoisting requirements, including hoisting loads in excess of 2 tons, hoisting material or equipment into spaces below grade, and hoisting requirements outside the building enclosure. (Rigging Insurance must be provided by each prime contractor)
   5. Collection and disposal of its own hazardous, dangerous, unsanitary, or other harmful waste material.
   6. Secure lock-up of its own tools, materials and equipment.
   7. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
   8. Maintaining temporary facilities provided by Contractor.
   9. Complying with the regulations of the Commissioner of Education - 8 NYCRR 155.5 - Uniform Safety Standards for School Construction and Maintenance Projects specified in Division 1 Section 011400.
   10. Containers for non-hazardous waste and debris generated by their own demolition and construction operations.

1.05 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to Owner, Architect or Owner's Construction Representative and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
   1. The Owner's Construction Representative.
   2. Other Contractors.
   3. Owners construction forces.
   4. Occupants of Project.
   5. Architect .
   6. Testing Agencies.
   7. Personnel of authorities having jurisdiction.

B. Water Service: Use water from the Owner’s existing water system without metering and without payment of use charges. Access to water shall be approved by the Owner.

C. Electric Power Service: Temporary electric power including set-up and maintenance is the responsibility of the Electrical Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Provide new materials. If acceptable to the Architect / Construction Manager, the Contractor may use undamaged, previously used materials in serviceable condition. P ovide materials suitable for use intended.

B. Lumber and Plywood:
   1. For job-built temporary offices, shops, and sheds within the construction area, provide UL-labeled, fire-treated lumber and plywood for framing, sheathing, and siding.
   2. For signs and directory boards: provide exterior grade APA HDO plywood of sizes and thicknesses indicated.
   3. For vision barriers, provide minimum 3/8-inch-thick exterior plywood.
   4. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch-thick exterior plywood over appropriate wood framing.

C. Paint:
   1. Paint surfaces exposed to view from Owner occupied areas in a color selected by the Owner's Construction Representative. Maintain coverage throughout the construction period.

D. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.

E. Water: Provide potable water approved by local health authorities. Protect water sources with approved backflow or vacuum breaker devices.

F. Open-Mesh Chain Link Fencing: Provide 0.120-inch-thick, galvanized steel posts, and 2.875" diameter. Gate posts with 6 foot high mesh on stanchion posts spaced 8-foot on center maximum. Provide lockable gates with galvanized chains and security padlocks. Furnish keys to the Owner, Owner's Construction Representative, Prime Contractor represesentatives, and nescessary construction personnel.

G. Temporary Roofing: 5/8" FR plywood roof sheathing and 45 mil reinforced EPDM membrane

H. Temporary Flooring protection : “ Ram Board" or equivalent with taped joints.

2.02 EQUIPMENT

A. General: Provide new equipment. If acceptable to the Architect, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.

B. Water Hoses: Provide 3/4-inch, heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge and vacuum breakers at hose bib connections .

C. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the potential exposures.
   1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.01 CONTRACTOR FIELD OFFICES

A. Contractors may, with permission from the Owner and Owner's Construction Representative, establish a field office for their own use. Offices for the individual prime contractors, sub-contractors, specialty contractors and the like shall be of size and design as approved by the Owner and Owner's Construction Manager. Offices shall be located in the designated staging

area. Each representative contractor shall arrange for telephone service and electric service, if required, directly with the utility company. (No field offices or storage trailers will be allowed within 100 feet of any building.)

B. Maintain, in the each contractor's field office, all articles for First Aid treatment. Each contractor shall also establish standing arrangements for the immediate removal and hospital treatment of any employees and other persons on the job site who may be injured or who may become ill during the course work.

3.02 TEMPORARY AND PERMANENT SERVICES, GENERAL

A. The Contractor's use of any permanent system or service of the building or portions thereof shall be subject to the Owners approval.

B. The Contractor shall be responsible for any and all damage to permanent services used, and shall make good any and all damage to the satisfaction of the owner, prior to final completion and acceptance.

C. NOTE - In accordance with OSHA and other applicable regulations, the representative Contractors performing erection of "skeleton" type work are solely responsible for the netting, guard rail protection and such other safety devices as deemed necessary to protect the workers and public from harm.

3.03 TEMPORARY LIGHT AND POWER

A. Temporary Electric Power Service: Electrical Contractor shall provide and pay all costs to provide a weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of work during the construction period.
   1. Responsibility: All work under this section to be provided by the Electrical Contractor.
   2. Applicability: This section applies to all renovation and new construction work areas for this Project.
   3. Electrical Contractor shall make arrangements with utility company for temporary and permanent services immediately after award of contract.
   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 Architect and Owner's Construction Representative.
   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 to be controlled by standard switches per code (outside of power panels).
   6. Electrical 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, heating units, etc. Coordinate required circuits with owner. Contractor shall assume a minimum of (2) 50 kw 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. Contractor shall include required fuel for operation.
   7. Electrical Contractor shall maintain power during the hours established by Owner's Construction Representative.
   8. Temporary Service: Install service and grounding in compliance with the National Electric Code (NFPA 70). Include necessary meters, transformers, overload protected disconnect and main distribution switch gear. Comply with all NECA, NEMA and UL Standards
   9. Provide temporary service with an automatic ground-fault interrupter feature, activated from the circuits of the system.
   10. Power Distribution System: Provide circuits of adequate size and proper characteristics for each use. In general run wiring overhead. Rise vertically where wiring will be least exposed to damage from construction operations.

11. Provide metal conduit, tubing or armored cable for protection of temporary power wiring where exposed to possible damage during construction operations. Where permitted by code, wiring of circuits not exceeding 110-120 Volt 20 Amp rating and wiring of lighting circuits may be non- metallic sheathed cable in areas where located overhead and exposed. Do not wire temporary lighting with plain, exposed (insulated) electrical conductors. Provide metal enclosures or boxes for wiring devices.
12. Provide overload-protected disconnect switch as required by code.
13. For power hand tools and task lighting, provide temporary 4-gang outlets at each floor level, spaced so that a 50-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).
14. Temporary electric power for Owner's Representative's field office.
15. Temporary power and lighting for any sidewalk bridges.
16. Maintaining all existing systems, including but not limited to, power, lighting, fire alarm, intercom, kitchen freezers and refrigerators, etc., within the existing building operational at all times for Owner occupancy and construction.

B. TEMPORARY ELECTRICAL AND TELEPHONE SERVICES
1. Temporary Power Source: At each building / renovation area, use the existing electrical power distribution system for temporary power source.
2. Owner's Requirements: Do not disrupt the Owner's needs for continuous power at each building.
3. Electrical Contractor shall provide temporary power and lighting facilities for use of all trades. All temporary light and power shall be in accordance with the required Codes and Safety Standards. The temporary light and power shall be used until permanent light and power is completed or portions of the building(s) are enclosed.
4. Owner's Construction Representative on-site trailer already has power and data/tel wiring
5. All other contractor trailer use / connection charges for power and telephone to be paid by the respective contractor.

C. TEMPORARY POWER DISTRIBUTION
1. General Requirements: Electrical Contractor shall provide feeders and branch circuits of adequate size and proper characteristics as required to supply temporary receptacle and lighting loads. Size service and feeder conductors to restrict voltage drop to maximum 5 percent at 80 percent power factor. Provide properly sized overcurrent protection for each temporary electrical circuit.

D. RECEPTACLE REQUIREMENTS
1. General Requirements: Provide temporary receptacle outlets as required for operation of portable tools and appliances during the construction period.
2. Minimum Requirements: Provide a minimum of one quad 120 volt receptacle per 2500 square feet of building floor area, with maximum spacing of 50 feet on center.
3. Branch Circuits: All temporary receptacle branch circuits to be rated 20 amps with a maximum of (3) duplex receptacles per circuit. Temporary receptacle branch circuits shall be independent of temporary lighting circuits.

E. LIGHTING REQUIREMENTS
1. General Requirements: Electrical Contractor shall provide both interior and exterior lighting at areas where existing lighting has been removed and at new construction areas, as required to provide adequate illumination for safe and proper construction operations and Project Site security.
2. Minimum Requirements: Provide illumination levels adequate for construction operations and safe traffic conditions. As a minimum provide one 200 watt lamp per 400 square feet of building floor area, with maximum spacing of 20 feet. Any rooms in excess of 500 sf will receive one 400 watt metal halide fixture for each 1000 sq. ft. of area.
3. Stairways: Provide one 200 watt lamp per landing at each stairway.
4. Barricades: Provide adequate lighting for personnel safety at barricades, ladders, openings and other similar locations.

5. Supplemental Lighting: If required, supplemental lighting beyond minimum requirements shall be provided via suitable portable lighting units with cord and plugs, and shall be paid for by the Contractor or Sub-Contractor requiring such additional lighting.
6. Branch Circuits: All temporary lighting branch circuits to be loaded to a maximum of 1400 watts per 20 amp circuit. Temporary lighting branch circuits shall be independent of temporary receptacle circuits.
7. Restrictions: Do not use permanent lighting systems for temporary construction lighting purposes.

F. MAXIMUM LOADS
1. General: Lighting and power loads connected to the temporary power distribution system shall be limited to the following maximum individual loads:

	Load Type	Maximum
a.	120 V, 1 Phase	1.5 KVA
b.	208 V, 1 Phase	2.5 KVA
c.	208 V, 3 Phase	5.0 KVA

2. General: The temporary power distribution system shall be sufficiently sized to provide temporary power as required within this section. Meter and Meter connections to be part of electrical contractors base bid.

G. ELECTRICAL WELDERS
1. Separate Power Sources Required: Power for electric welders and for other loads larger than the maximum allowable sizes shall be taken from portable power sources provided, paid for and operated by the Contractor or Sub-Contractor requiring the use of such equipment. Remove such power sources when no longer needed.

H. ELECTRICAL ENERGY COSTS
1. Paid By Owner: Charges for electrical energy usage for temporary power and lighting will be paid by the Owner, when taken from the Owner's electrical services. Contractor and Sub-Contractors shall exercise measures to conserve energy usage. Use of Owner supplied electric for items not specific to project (e.g. heating construction shanties, etc.) will not be permitted.

I. USE CHARGES
1. General: Cost or use charges for temporary facilities are not chargeable to the Owner or the Architect, Engineer, or Owner's Construction Representative. The Architect and Owner will not accept a prime 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.
   a. Water Service Use Charges: Water from the Owner's existing water system may be used without metering, and without payment for use charges.
   b. Electric Power Service Use Charges: Electric power from the Owner's existing system may be used without payment of use charge

3.04 TEMPORARY TOILET FACILITIES

A. Sanitary Facilities: Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with governing regulations including safety and health codes for the type, number, location, operation and maintenance of fixtures and facilities; provide not less than specified requirements. Install in locations which will best serve the project's needs. Owner's existing facilities shall not be used.

B. Responsibilities: The General Construction Contractor is responsible for temporary sanitary facilities and their maintenance, cleaning and supplies for use by all trades. Sufficient quantity/locations to properly handle the amount of workers on-site.

C. Supply and maintain toilet tissue, paper towels, paper cups and other disposable materials as appropriate for each facility, including Owner's Construction Representative temporary offices for full contract duration. Provide covered waste containers for used material.

D. Install self-contained toilets to the extent permitted by governing regulations.

E. Provide separate toilet facilities for male and female construction personnel.

F. Provide separate toilet facilities for Owner's Construction Representative located at _____ at the direction of Owner's Construction Representative.

3.05 TEMPORARY HEATING

A. The Mechanical Contractor will maintain 60 degree temperature in all areas via temporary and/or permanent systems. The Mechanical Contractor will submit a detailed plan including sketches indicating his proposed temporary heating system for engineer approval within 1 week of contract award. The Electrical Contractor will provide permanent or temporary power for the Mechanical Contractor's units for temporary heating. General Work Contractor will insure all windows / doors and work areas are fully enclosed. (Any missing components at time of temporary heat activation will be enclosed via 5/8 inch thick plywood, 2" rigid polyisocyanurate and 6-mil fire-retardant polyethylene sheeting for a weather-tight insulated enclosure.)

B. The fuel, equipment, materials, operating personnel and methods used therefore shall be at all times satisfactory to the Architect and Owner's Construction Representative and adequate for the purpose intended. The use of electric heaters is not acceptable. All required fuel is part of this contract.

C. The Contractor shall maintain the critical installation temperatures provided in the technical provisions of the specifications herein for all work in those areas where same is being performed.

D. The maintenance of proper heating, ventilation and adequate drying out of the work is the responsibility of the contractor and any work damaged by dampness, insufficient or abnormal heating, shall be replaced to the satisfaction of the Architect by and at the sole expense of the contractor.

E. Before and during the placing of gypsum and the application of other interior finishes, taping, varnishing, painting, etc. and until final acceptance by the Owner of all work covered by the Contract, the contractor shall, unless otherwise specified in the contract documents, maintain a temperature of 60 degrees F. Coordinate with Division 9 of the Technical Specifications.

F. Use of the permanent system, if approved by engineer and owner permission granted, shall not shorten, or negate any equipment, or system guarantees required under this contract. (the warranty period starts upon the date of Substantial Completion). Two additional filter changes are to be provided by Mechanical Contractor. A program of use, maintenance and restoration will be submitted with request for use of systems for temporary services.

3.06 TEMPORARY WATER

A. The Plumbing Contractor shall:
   1. Provide and maintain a temporary water system of size and capacity as required below to supply the needs of all Contractors for the work.
   2. Provide no less than two 3/4 inch hose bibs conveniently located at each building wing.
   3. Provide and pay for all connections and permits.
   4. Install such temporary water system so that service shall be available at the commencement of the work. The permanent water risers and lines may be used for temporary water supply. The permanent services shall be turned over to the Owner in perfect condition. Any repairs required due to temporary use shall be made at the sole expense of the plumbing contractor.
   5. Protect temporary and permanent lines against any damage.
   6. Remove all temporary lines when directed by the Owner's Construction Representative when such lines are no longer required.
   7. Water source is only available from building. If contractor decides distance is too far he should use water storage tanks or struck at no additional charge to the owner.

B. Each Contractor shall:
   1. Provide all hose and other extensions from connections installed by the Plumbing Contractor and all labor, materials and supplies required to supply water to the work.
   2. Prevent water damage to the work.

3.07 STORAGE FACILITIES

A. Each Contractor shall provide temporary storage shanties, tool houses and other facilities as required for their own use. Temporary structures shall be located at the 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 Owner's Construction Representative 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.

3.08 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.

3.09 RUBBISH CONTAINER

A. Each Contractor shall provide suitable rubbish container device(s) for his own use (both demolition and construction debris), properly maintained and serviced, replaced as required and protected from access by the public fencing as may be specified herein or approved by the Architect and Owner's Construction Representative.

B. Contractor and Subcontractor shall sweep up and gather together daily all his own rubbish and removed materials and place same in containers.

3.10 CONSTRUCTION FENCING

A. Construction fencing and barriers shall be provided by the General Construction Contractor, enclosing all work and storage areas as outlined in staging, plan and specified within. Temporary construction fencing shall be of good quality and neat in appearance.

B. Site access gates shall be provided as required, complete with all operating hardware and security devices.

C. Should fencing be required to be relocated or modified during the course of the project due to additional access needed by the contractor, same shall be done at the total expense of the contractor.

D. The construction fence shall be maintained in good order by all contractors throughout the life of the project.

E. Note: Should any contractor damage or cause the need for repair to the construction fence, all costs involved with said repair will be back-charged to the contractor creating the need for repair.

F. General Construction Contractor shall provide a 60’ x 150' fenced staging area at the location designated on the drawing for use by all trades. All fenced areas to be 6' high galvanized chain link fencing, 9 ga fabric on 10’ long framed sections on stanchions. Gate locations as directed by Owner's Construction Representative. If additional storage is necessary, the contractors may use the remote staging area where Owner's Construction Representative's trailer is located.

3.11 JANITORIAL SERVICE/DAILY CLEANUP

A. Each Contractor shall furnish daily janitorial services for the project and perform any required maintenance of facilities as deemed necessary by the Architect and Owner's Construction Representative during the entire life of the contract. If any contractor fails to keep the site safe and broom clean within 4 hours of being notified by Architect or Owner's Construction Representative, either verbally or in writing, the Owner's Construction Representative will have the cleanup work performed by others and the contractors will be back charged accordingly.

1. The Contractor shall provide daily trash collection and cleanup of the project area and shall dispose of all discarded debris, and the like in a manner approved by the Owner's Construction Representative.

3.12 BURNING

A. Burning will not be permitted.

3.13 MAINTENANCE OF PERMANENT ROADWAYS

A. The General Construction Contractor shall immediately remove dirt and debris which may collect on permanent roadways created by their work, deliveries, manpower, equipment, etc.

B. Temporary roads / entrance mats will be maintained by General Construction Contractor to insure that no mud, dust, dirt goes onto asphalt areas.

3.14 FIRE PREVENTION CONTROL

A. Each Contractor shall comply with the safety provisions of the National Fire Protection Association's "National Fire Codes" pertaining to the work and, particularly, in connection with any cutting or welding performed as part of the work.

3.15 TEMPORARY FIRE PROTECTION

A. Each Contractor shall take all possible precautions for the prevention of fires.
   1. Where flame cutting torches, blow torches, or welding tools are required to be used, their use shall be as approved by the Owner's Construction Representative at the site.
   2. When welding tools or torches of any type are in use, have available in the immediate vicinity of the work a fire extinguisher of the dry chemical 20 lbs. Type. The fire extinguisher(s) shall be provided and maintained by the Contractor doing such work.

B. Fuel for cutting and heating torches shall be gas only and shall be contained in Underwriters laboratory approved containers.

C. Storage of gas shall be in locations as approved by the Owner and subject to Fire Department regulations and requirements.

D. 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.

E. 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. Any cylinder not having the proper ICC markings or re-inspection 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.

F. Each Contractor shall comply with the following requirements relating to welding and cutting:
   1. All cutting and/or welding (electric or gas) must be done only by skilled, certified and licensed personnel.
   2. During welding or cutting operations, a contractors man shall act as a fire watcher. The fire watcher shall have proper eye protection and suitable fire fighting equipment including fire extinguisher (bearing current inspection Certificate), protective gloves and any other equipment deemed necessary.
   3. Welding or cutting shall not be done near flammable liquid, vapors or tanks containing such material.
   4. Where cutting or welding is done above or adjacent to (within two feet) combustible material or persons, a shield of incombustible material shall be installed to protect against fire or injury to sparks or hot metal.
   5. Tanks supplying gases for welding or cutting are to be placed in an upright position securely fastened, and close as practical to the operation. Tanks, actives or spares, shall be protected from excess heat and shall not be placed in stairways, hallways or exits. When not in use, protective valve cap shall be screwed on the cylinder.
   6. Adequate fire extinguishing equipment shall be maintained at all welding or cutting operations.
   7. The Contractor shall secure all required inspections.
   8. All equipment, hoses, gauges, pressure reducing valves, torches, etc., shall be maintained in good working order and all defective equipment shall immediately be removed from the job.
   9. No person shall be permitted to do any welding or cutting until his name, address and current license number have been submitted in writing to the Owner.

G. Contractors for work outside the building shall commence operations promptly on award of Contract, and shall be responsible for same being kept clear of materials and debris in connection with their own work and that of other Contractors. If a Contractor for outside work allows other contractors to deposit material and debris over its lines, the Contractor shall be responsible for all delay and extra cost occasioned thereby.

3.16 DISCONTINUE, CHANGES AND REMOVAL

A. All Contractors shall:
   1. Discontinue all temporary services required by the Contract when so directed by the Construction Manager or 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.

3.17 VENTILATION AND HUMIDITY CONTROL FOR CONSTRUCTION:

A. General Construction Contractor will provide temporary ventilation as required for protecting the building from any adverse effects of high humidity during abatement and construction activities. Select dehumidification and ventilating equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements and have sufficient quantity of units to produce necessary ambient conditions.
   1. Each Contractor shall be responsible for his own temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity.

2. Ventilate enclosed area to dissipate humidity, and to prevent accumulation of dust, fumes, vapors or gases.
3. Provide equipment as necessary for air and fresh exchange for the work area per OSHA standards.
4. Remove temporary ventilation equipment prior to the completion of construction.
5. If Contractor fails to adequately ventilate the building during the construction, abatement / roofing process, thereby causing humidity and possible mold issues, the owner will hire others to properly address and deduct costs from the Contractor accordingly.
6. General Construction Contractor will provide negative air machines of sufficient size/qty to fully ventilate the square footage of work areas and exhaust any dust/fumes through flexible duct hose to exterior top eliminate any orders / smoke.
7. Any contractor that allows water infiltration into any building shall be held responsible for the cleanup and provision of commercial dehumidifiers of sufficient size and quantity to prevent the generation of mold spore growth. Failure on the contractors part to address this issue within 4 hours of notice, will result in the Owner hiring outside parties to accomplish the required work in order to insure a safe environment. Owner will subsequently backcharge the contractor responsible for the water infiltration for all associated costs of hiring this outside contractor to carry out the work required.

3.18 ROOF PROTECTIONS

A. The General Construction Contractor shall provide temporary protection on the roof surface when it is necessary for work to take place on completed roof areas. Other Primes shall be held responsible to notify the General Construction Contractor of their work and required roof protection areas.

B. When requested by other trades as noted above, the General Construction Contractor shall provide a minimum of 2 inch thick Polyisocyanurate or Extruded Polystyrene (40 psi) rigid insulation with a 5/8” plywood overlay to protect existing roofing system from damage. Provide removable weighting systems to protect against wind uplift / blow-offs of these protective materials.

C. Based upon the requirements noted above, the General Construction Contractor shall assume responsibility for any damage(s) to the roofing system caused by the work of other trades, except that financial responsibility for any damage(s) to the roofing system shall be that of the Contractor responsible for the damage(s) as determined by the Owner's Construction Representative.

3.19 SIGNAGE

A. The General Construction Contractor shall provide signs as required below. Install signs where required or indicated to inform public and persons seeking entrance to project site. All signage and posts provided shall become the property of the District at the conclusion of the project.

B. Prepare temporary signs to provide directional information to construction personnel and visitors.

C. Construct signs in accordance with section 619 of the NYS DOT standard specifications (MUTCD overall sign size, letter size, metal signage). Support on breakaway metal posts or attach to fencing using zip ties to prevent unauthorized removal; do not attach signs to buildings or permanent construction.

D. 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. Signs shall have an orange background with black letters/graphics unless directed otherwise.

E. Include relocating temporary site safety and directional signs as many times as required or directed by the Owner's Construction Representative.

F. The General Construction Contractor shall furnish, install and relocate all construction signage as required at each project site.

G. Project Sign Requirements:

1. Ten (10) signs shall be provided and located (and relocated) as designated by the District or Owner's Construction Representative for construction traffic control/flow at entrances/exits.
2. Four (4) signs for "Construction Parking".
3. Four (4) signs to direct deliveries
4. Ten (10) signs for "Emergency egress only - Construction Area" per OSHA standards.
5. Ten (10) signs for “No Smoking” safe work site at multiple locations as directed by Owner's Construction Representative.
6. Fifteen (15) signs for "Construction Area - Do Not Enter" mount on fence as directed by the Owner's Construction Representative.
7. Ten (10) signs for "No Trespassing" mounted on construction fence as directed by the Owner's Construction Representative.

H. A pre-mobilization meeting to establish location and quantities of all signage will be held with contractor, Construction Manager, and the Owner. Prior to the start of any actual work the signage must be reviewed / approved by the Owner's Construction Representative.

3.20 ENVIRONMENTAL PROTECTION:

A. The General Construction Contractor shall provide protection, operate temporary facilities, and conduct construction with means and methods that comply with local and state environmental regulations and that minimize possible air, waterway, and subsoil contamination, pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict the use of noise-producing tools and equipment to hours that will minimize complaints from persons, residential occupants, or firms near Project site.

3.21 STORMWATER CONTROL

A. The General Construction Contractor shall provide earthen embankments, silt fencing, haybales, and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater.

3.22 SECURITY ENCLOSURE AND LOCKUP:

A. Each Contractor shall provide protection and security for partially completed areas of construction. Provide barricades to prevent unauthorized access, vandalism, theft, and similar violations of security.

3.23 BARRICADES, WARNING SIGNS AND LIGHTS:

A. Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard.
   1. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch thick exterior grade APA BC plywood with structurally adequate supports and/or scaffolding as approved by the Owner's Construction Representative.

3.24 TEMPORARY ENCLOSURES

A. The General Construction Contractor shall provide temporary enclosures for protection of construction from exposure to inclement weather and for safety of any roof related openings. Close openings in roof deck with load bearing wood frame construction members (sized for design roof loads), 5/8" exterior grade, structural 1, APA BC plywood and watertight EPDM adhered membrane.

B. The General Construction Contractor shall fully enclose all windows / door openings. Maintain access and egress for workers via secured temporary doors / gates. During periods of temporary heat provisions, provide 5/8 inch, exterior grade, APA BC plywood with 2 inch rigid polyisocyanurate and 6 mil polyethylene sheeting for a weather-tight, secure and insulated enclosure. Temporary doors shall each have an exit device and door closer.

C. Any other temporary enclosures for specific openings for any contractor to perform their work shall be the responsibility of the contractor requiring / creating the opening. These openings shall

be installed to protect the building from exterior elements, security issues, odors and noise resulting from construction operations.

3.25 TEMPORARY PARTITIONS

A. The General Construction Contractor shall erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate work areas.
   1. Construct dustproof, floor to ceiling partitions of not less than 3-5/8” - 20 ga. studs; 2 layers of 6 mil fire-retardant polyethylene sheets inside / outside; 5/8 inch thick exterior grade plywood sheathing; 5/8 inch thick interior, Type X gypsum board, taped spackled (1 coat) and painted.
   2. Cover floor with 2 layer fire retardant polyethylene and extend 18 inches vertically at each side. Overlap and tape all joints.
   3. Sound insulate partitions to provide noise protection to occupied areas
   4. Caulk joints and perimeter to prevent dust migration. Equip partitions with dustproof doors and security locks.
   5. In addition to any temporary partition locations shown on drawings, the General Construction Contractor shall include in its base bid a minimum of six (6), 9 foot by 12 foot temporary partitions meeting criteria listed above for use and located where directed by the Owner's Construction Representative. Each location shall be equipped with a 3 foot wide by 7 foot high hollow metal door/frame with hinges, closer and exit device hardware.

3.26 AREA OF SPECIAL PROTECTION

A. In the event of an emergency (designated by the sounding of the fire alarm system) all construction activities must immediately cease. Contractor’s work force will evacuate themselves from work areas and remain outside of work areas until the “all clear" is given. No work operations will be tolerated during the evacuation of the building or during an emergency.

B. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.27 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.
   1. Maintain operation of temporary enclosures on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
   2. Protection: Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended and no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been affected because of interference with the temporary construction / facilities. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are the property and responsibility of the General Construction Contractor.
   2. At Substantial Completion, clean, repair and renovate permanent facilities used during the construction period.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section includes the general requirements for products that are to be furnished, installed, or otherwise incorporated into the project.

1.02 QUALITY ASSURANCE APPLIES TO ALL PRODUCTS

A. In addition to the Contractor's warranties and guarantees on materials and equipment required under the General Conditions of the Contract and the Technical Specifications contained hereinafter, the Contractor shall also be responsible for all materials, equipment, and products that have or is planned to be incorporated into the work.
   1. The Contractor shall be responsible for the finished work and that it accurately and completely complies with these Contract Documents.
   2. The Contractor shall be responsible for work performed by subcontractors, equipment suppliers, and material vendors.
   3. The Contractor shall be satisfied as to the product's performance before it is ordered for installation. At the Contractor's option, he/she shall have tested each product to determine compliance with these specifications.

B. The Architect/Engineer may check all or any portion of the work and the Contractor shall afford all necessary assistance to the Architect/Engineer in carrying out such checks.
   1. Such checking by the Architect/Engineer shall not relieve the Contractor of any responsibilities for the accuracy or completeness of the work.
   2. Such checking is a courtesy service being provided by the Owner and does not relieve the Contractor of his/her responsibilities under this Construction Contract.

C. If witnessed shop tests or inspections are required at the point of manufacture, the Contractor shall keep the Architect/Engineer advised as to the progress of the work to allow inspection at the proper time and place. Provide at least two (2) weeks advance notice before scheduled shop tests.

D. Should a dispute arise as to the quality of workmanship, equipment or material performance, then the final decision regarding acceptability with these Contract Documents shall be that of the Owner.

E. At the request of the Architect/Engineer, the Contractor shall promptly provide the services of a competent representative of the manufacturer at the project site, fully equipped and prepared to answer questions, perform tests, make adjustments and to prove compliance with the Contract Documents free of all additional charges. Proof of compliance shall be the responsibility of the Contractor, and such special visits to the project site by the manufacturer shall not be eligible under any cash allowances or stipulated man-hours necessary to startup the system and/or train the Owner as may be specified in the Technical Specifications.

1.03 QUALITY ASSURANCE - EQUIPMENT

A. Erect and install products under the supervision of a competent and experienced superintendent. The method of installation, including anchorage, clearances, and tolerances for rotating assemblies, methods of support for equipment and adjacent piping, shall be as recommended by the equipment manufacturer unless detailed on the Drawings or specified.

B. All material furnished shall be new, and guaranteed free from defects in workmanship, installation, and design.

C. Design and fabricate equipment in conformance with ANSI, ASTM, ASME, ASHRAE, IEEE, NEC and NEMA Standards.
   1. Equipment shall withstand the stresses that may occur during fabrication, testing, transportation, installation and conditions of operation.
   2. Pumps shall conform to the requirements of the Hydraulic Institute.
   3. Equipment shall comply with the latest OSHA regulations and the ANSI Safety Standards.

D. Equipment shall be products of manufacturers who produce evidence of their ability to promptly furnish any and all interchangeable replacement parts as may be needed at any time within the expected life of the equipment.

E. Manufacturers shall also have readily available access to suitable and accurate testing facilities for performing the required shop tests.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Equipment shall have been in successful regular operation under comparable conditions for a period of at least five (5) years.
   1. This time requirement does not apply when the manufacturer posts an Owner/Architect/Engineer acceptable Performance Bond or Letter of Credit for the duration of the time period that will guarantee replacement of the equipment in the event of failure.
   2. The bond shall be in a form that is acceptable to the Owner's legal council.

B. The Owner reserves the right to reject any material or equipment manufacturer who, although he appears to be qualified and meets the technical requirements, does not provide satisfactory evidence indicating adequate and prompt post-installation repair and maintenance service, as required to suit the operational requirements of the Owner.

C. Whenever it is required that the Contractor furnish materials or manufactured articles or shall do work for which no detailed specifications are set forth, the materials or manufactured articles shall be of the best grade in quality and workmanship obtainable on the market from firms of established good reputation, or, if not ordinarily carried in stock, shall conform to the usual standards for first-class materials or articles of the kind required.

D. Perform work in full conformity and harmony with the intent to secure the best standard of construction and equipment of the work as a whole or in part.

E. Items of any one type of material or equipment shall be the product of a single manufacturer.
   1. For ease of the Owner in maintaining and obtaining service for equipment and for obtaining spare parts from as few places as possible, to the maximum extent possible, use equipment of a single manufacturer.
   2. The Architect/Engineer reserves the right to reject any equipment from various manufacturers if suitable equipment can be secured from fewer manufacturers and to require that source of materials be unified to the maximum extent possible.

F. Substitute equipment shall not be fabricated nor installed until after written decision to accept request is received from the Architect/Engineer.

2.02 NAMEPLATES

A. Each unit of equipment shall have the manufacturer's name or trademark on a stainless steel nameplate securely affixed in a conspicuous place.

B. The manufacturer's name or trademark may be cast integrally with stamp, or otherwise permanently marked upon the item of equipment.

C. Such other information as the manufacturer may consider necessary for complete identification shall be shown on the nameplate.

2.03 FABRICATIONS

A. Insofar as possible, shop prefabricate all items complete and ready for installation.

B. Accurately fabricate all items to the details shown on the Drawings and on the shop drawings found in compliance with the Contract Documents.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prior to work under any Section, carefully inspect the existing work and verify that it is complete to the point where the work under that Section may properly commence.

B. Avoid the need to remove and replace work and to avoid unnecessary cutting and patching.

C. Inspect all surfaces to be sure that they have been properly prepared before applying new work to such surfaces.

D. Verify that all work can be installed in strict accordance with the drawings and the approved shop drawings. Immediately report discrepancies to Architect/Engineer.

E. Do not proceed with the work under any Section until these conditions are obtained.

3.02 INSTALLATION

A. Furnish and install materials and equipment in accordance with the instructions of the applicable manufacturer, fabricator or processors, except as otherwise provided in the Contract Documents.

B. All work shall be done in a workmanlike manner and set to proper lines and grades. The work shall be square, plumb and/or level as the case may be.

C. Where performance criteria are specified, do all work necessary to attain the required end results.

3.03 FIELD QUALITY CONTROL

A. Neither observations by Architect/Engineer nor inspections, tests or approvals by other persons shall relieve the Contractor from his obligations to perform the work in accordance with the requirements of the Contract Documents.

B. If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any work to specifically be inspected, tested or approved by some public body, the Contractor shall assume full responsibility therefore, pay all costs in connection therewith, and furnish the Architect/Engineer with the required certificates of inspection, testing or approval.

C. The Owner reserves the right to independently perform laboratory tests on random samples of material or performance tests on equipment delivered to the site.
   1. These tests, if made, will be conducted in accordance with the appropriate referenced standards or specification requirements.
   2. The entire shipment represented by a given sample, samples or piece of equipment may be rejected on the basis of the failure of samples or pieces of equipment to meet specified test requirements.
   3. All rejected materials or equipment shall be removed from the site, whether stored or installed in the work, and the required replacements shall be made, all at no additional cost to Owner.

3.04 ADJUST AND CLEAN

A. Upon the completion of installations, and as a condition of its acceptance, visually inspect all work, adjust all components for proper alignment and touch-up abrasions and scratches to make them completely invisible.

B. Thoroughly examine all materials and equipment with protective or decorative finishes for defects and damage prior to being covered.
   1. In the case of buried items of work, restore protective surface covers so as to conform to the Contract Documents prior to being backfilled, buried or embedded, as the case may be.
   2. In the case of exposed items of work, for which a decorative finish is required, all scratches, discoloration's, unmatched colors, disfigurations and damages shall be repaired and touched-up so as to provide a neat, clean finish, and be uniform in color.

3.05 UNCOVERING WORK

A. Unless otherwise specified or directed by Architect/Engineer, no work shall be covered until it has been observed, tested, photographed, measured, and authorized to be covered by Architect/Engineer.

B. Tie distances to above ground physical structures as reference points to all underground utilities, conduits, pits, manholes, valves, and pipelines shall be obtained by the Contractor prior to covering the work. Immediately comply with the Architect/Engineer's direction to uncover the work if tie distances were not obtained.

C. If any work has been covered with Architect/Engineer's consent and Architect/Engineer considers it necessary or advisable that covered work be observed or tested, the Contractor, at Architect/Engineer's request, shall uncover, expose or otherwise make available for observation, or testing as Architect/Engineer may require, that portion of the work in question, furnishing all necessary labor, material and equipment.
   1. If it is found that such work is defective, the Contractor shall bear all the expenses of such uncovering, exposure, observation, and testing of satisfactory reconstruction, including compensation for additional engineering services and an appropriate deductive change order shall be issued.
   2. If, however, such work is not found to be defective, the Contractor shall be allowed an increase in the contract price or an extension of the contract time, or both, directly attributable to such uncovering, exposure, observation, testing and reconstruction if he makes a claim therefore as provided in the General Conditions.

3.06 DEFECTIVE WORK

A. The repair, removal, replacement and correction of defective work is a part of this Contract and shall be promptly performed in accordance with the requirements set forth in the General Conditions or other portions of the Contract Documents. All costs in connection with the correction of defective work shall be borne by the Contractor.

B. Products that fail to maintain the performance or other salient requirements of the Contract Documents, shows undue wear, or other deleterious effects during the maintenance period, shall be considered defective.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The Section includes the transportation, handling, storage and protection of products that are to be incorporated into the work.

B. The procedures for turning equipment over to the Owner for installation by others is also included herein.

1.02 GENERAL

A. Items shall be delivered as complete assemblies direct from the manufacturer with all internal wiring, piping, valving, and control devices intact except where partial disassembly is required by transportation regulations, protection of components, or where physical constraints may exist or be created for the setting of the item.

B. Coordinate the disassembly and reassembly requirements with the manufacturer. Determine the need and extent of reassembly prior to bid.
   1. All labor, material and equipment costs associated with the disassembly and reassembly of the product shall be included in the Contract Price.
   2. Where reassembly of equipment is necessary, then the manufacturer shall provide reassembly instruction at the project site.
   3. A technician shall be present during the entire reassembly procedure and the manufacturer shall certify, in writing, that the unit was reassembled properly in accordance with instructions provided by the manufacturer and that all as-specified warranties remain in effect.
   4. The manufacturer's reassembly inspection time shall be in addition to the field service time specified and shall be included in the Contract Price. This time shall not be eligible for payment under any cash allowance item.

C. In the case where equipment is to be installed by others, then the supplying contractor shall be responsible for its reassembly. If reassembly is necessary and the unit(s) are to be set inside an enclosure or building, reassemble the equipment inside said enclosure. The equipment once reassembled shall be turned over to the installing contractor as specified below.

1.03 PACKING

A. Transport products in containers, crates, boxes or similar means such that the products are protected against damage that may occur during transportation.

B. All parts shall be packaged separately or in container where parts of similar systems are grouped.

C. Part numbers shall be indicated on the individual part. Use indelible ink to mark part numbers.

D. All equipment shipments shall be included with a parts list showing a description (name) of the part and the manufacturer's part number.
   1. The parts list shall be shipped in a plastic zippered envelope with the words "Parts List" lettered on it in indelible ink.
   2. The parts list shall be placed inside the shipping container so that it is on the top of the contents.

E. Equipment shall be shipped with storage, handling and installation instructions.
   1. The Engineer reserves the right to withhold payment for equipment delivered to the site until such time as the storage, handling and installation instructions are supplied by the manufacturer.
   2. In the case where operation and maintenance manuals have been provided by the manufacturer, which includes the installation instructions, then the installation instructions shall also be included with the equipment shipment.

F. Delicate instruments and devices, reagents, chemicals, and glassware shall be shipped in packaging normally provided by the manufacturer.

G. The Contractor shall require the manufacturer to be responsible for the proper packing of all products.

1.04 SHIPPING AND DELIVERY

A. Product deliveries shall be accompanied with a bill of lading indicating the place of origination and the Contractor's purchase order number.

B. Inspect shipments immediately upon delivery, to assure compliance with requirements of the Contract Documents and those products are undamaged.

C. Promptly remove damaged material and unsuitable items from the job site.

D. Provide equipment and personnel to handle products by methods to prevent soiling; disfigurement or damage.

1.05 STORAGE

A. Store sensitive products and all spare parts in weather tight, climate controlled enclosures in an environment favorable to product.

B. Store and protect products in accordance with the manufacturer's instructions.

C. All other products that are to be installed underground or products such as pipe, valves, and fittings shall be stored outdoors but shall be blocked off the ground and covered with impervious sheet coverings.

D. Store fabricated products above the ground on blocking or skids.

E. Store loose granular materials in well-drained areas on solid surfaces to prevent mixing with foreign matter.

F. Provide adequate ventilation to avoid condensation.

G. In accordance with manufacturer's instructions protect bearings, couplings, shafts, rotating components, and assemblies. Protection of said equipment shall be continuous until the time the equipment is placed into permanent service.

H. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

I. Do not store volatile liquids in any building on site.

J. Storage of products shall be the responsibility of the supplying contractor. The installing contractor shall take all necessary precautions to protect the equipment being furnished by others.

K. Store with seals and labels intact and legible.

1.06 EQUIPMENT INSTALLED BY OTHERS

A. All products, except products noted on the Drawings or specified, shall be furnished and installed under this Contract.
   1. Only noted or specified products shall be furnished under this Contract for installation by others.
   2. If it is not noted on the Drawings or specified, then the product shall be furnished and installed under the Contract.

B. The Contractor shall furnish these products to the Owner. These products shall be stored as specified above.

C. The Owner will then advise the installing contractor that the product(s) are ready for installation.
   1. In the case where the product is stored in a proper enclosure, but not stored inside the building to be constructed under this project, then the installing contractor shall move the product into the building to a location adjacent to the final location shown on the Drawings.
   2. In all cases, the installing contractor shall be responsible for moving from storage, uncrating, anchoring, mounting and installing the product as required by the Contract Documents.

D. The Contractor and installing contractor(s) shall be present at the time the equipment is turned over to the Owner. Immediately thereafter, the Owner will turn the product over to the installing contractor for installation.

E. The Owner, Contractor, Architect/Engineer and the installing contractor shall inspect the condition of the product at this time.
   1. Any defects in the product will be noted and the Contractor will be advised to make all repairs immediately.
   2. The installing contractor shall still be required to install the product if the damage is deemed cosmetic by the Architect/Engineer.
   3. The manufacturer's installation instructions or wiring diagram shall be turned over to the installing contractor at this time by the Contractor.
   4. Any damage occurring to the product during moving, setting and mounting the unit(s) shall be the responsibility of the installing contractor.
   5. The Contractor is advised to take photographs to document the condition prior to it being turned over to the installing contractor.
   6. The installing contractor is advised to take photographs to document the condition prior to its acceptance.

F. The supplied unit(s) remain the property of the Contractor until final acceptance of the work.

G. Any damage caused to the unit(s) due to improper installation, workmanship, and non-compliance with the manufacturer's written installation instructions shall be the responsibility of the contractor who caused said damage. The burden of proof shall rest with the supplying Contractor.

H. In the event the Contractor discovers misuse, abuse or improper installation of the unit(s) by the installing contractor, then he shall immediately notify the Architect/Engineer in writing. The Architect/Engineer will investigate the accusations and make a determination. The Architect/Engineer's determination shall be binding and agreed to by both parties.

I. If the Architect/Engineer's determination substantiates the accusations of the Contractor, then the Contractor shall install the unit(s), the costs for which will be paid for as extra work. All costs associated with the extra work change order, including engineering and attorney fees of the Owner and Contractor will be deducted from money due the installing contractor.

1.07 PROTECTION OF WORK

A. The Contractor shall protect the installed work. All costs for protection shall be borne by the Contractor. Provide coverings as necessary to protect installed products from damage, from traffic and subsequent construction operations. Remove when no longer needed.

B. Cover and protect equipment from dust, moisture or physical damage. Protect finished floor surfaces prior to allowing equipment or materials to be moved over such surfaces. Maintain finished surfaces clean, unmarred and suitably protected until accepted by the Owner.

C. Additional time required to secure replacements and to make repairs will not be considered by the Architect/Engineer to justify any extension in the Contract Time of Completion. In the event of the damage, promptly make replacement and repairs to the approval of the Engineer at no additional costs.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section This Section includes administrative and procedural requirements for cutting and patching.

B. Definition: "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition, and does not apply to new construction procedures, except when new construction is already completed and must be cut and patched due to incorrect sequencing of work and/or improper coordination.

C. Provisions of this Section apply to the construction activities of each prime Contractor. Contractors are reminded that they will need to hire tradesman skilled in the patching finishes that are impacted by their activities. (e.g. plumber will need to have a mason patch back existing walls opened for new roughing , Heating Contractor will hire carpenter for existing ceiling replacements after new air handler installed, etc)

D. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 1 Section 013100 - PROJECT MANAGEMENT AND COORDINATION for procedures for coordinating cutting and patching with other construction activities.
   2. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
      a. Requirements of this Section apply to all trades. Refer to specification sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.02 RESPONSIBILITIES

A. General: Each Prime Contractor is responsible to perform cutting and patching for their portion of the Work. Patching work shall restore all surfaces to their original condition.

B. Cutting and patching of completed new construction required due to out of sequence construction and/or improper coordination is the responsibility of the prime Contractor responsible for the out of sequence construction or improper coordination. Cutting and patching of new construction for these purposes shall be accomplished by the General Construction Contractor and shall be paid for by the prime Contractor responsible. The Owner's Construction Representative shall be the sole judge of the responsibility for such cutting and patching, and shall prepare change orders to delete monies from the responsible prime Contract and credit those monies to the General Construction Contractor.
   1. Each Contractor shall cooperate with the Owner's Construction Representative to accomplish cutting and patching with minimal disruption to the construction and at reasonable cost.

1.03 SUBMITTALS

A. Cutting and Patching Plan: If the Owner requires approval of cutting and patching procedures before proceeding, submit a plan describing cutting and patching procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the submittal:
   1. Describe the extent of cutting and patching required. Show how it will be performed and indicate why it cannot be avoided.
   2. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well as changes in the building’s appearance and other significant visual elements.
   3. List products to be used and firms or entities that will perform the work.
   4. Indicate dates 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, including their new locations, and those that will be required to be placed temporarily out-of-service. Indicate how long service will be disrupted and when service will be restored..

6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of additional reinforcement with the original structure.
    a. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of unsatisfactory work.
    b. Submit a detailed plan, including an area-specific drawing, indicating how dust mitigation and noise control will be handled to prevent disruption/dusting of adjacent areas. Identify routes of waste removal and dumpster locations, material handling from staging area, placement of protections, controls, etc.

1.04 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.
    1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
        a. Bearing and retaining walls.
        b. Structural concrete.
        c. Structural steel.
        d. Lintels.
        e. Structural decking.
        f. Miscellaneous structural metals.
        g. Exterior curtain-wall construction.
        h. Equipment supports.
        i. Piping, ductwork, vessels, and equipment

B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.
    1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
        a. Primary operational systems and equipment.
        b. Air or smoke barriers.
        c. Water, moisture, or vapor barriers.
        d. Membranes and flashings.
        e. Fire protection systems.
        f. Noise and vibration control elements and systems.
        g. Control systems.
        h. Communication systems.
        i. Conveying systems.
        j. Electrical wiring systems.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Architect’s opinion, reduce the building’s aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.

1.05 WARRANTY

A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner so as not to void any existing or required warranties.

B. Utilize manufacturer certified installers for work on any existing roof area, which are impacted, to ensure that the owners current warranty is maintained in full force.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible. If identical materials are not available or cannot be used, use materials whose installed performance will be equal to or surpass that of the existing materials.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.
   1. Before proceeding, meet at the Project Site with parties involved in cutting and patching, including but not limited to; Owner's Construction Representative, mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.02 PREPARATION

A. Temporary Support: Provide temporary support of work to be cut, including shoring, lumber, plywood, etc.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Avoid interference with the use of adjoining areas or interruption of free passage to adjoining areas.

D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

3.03 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
   1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with the original Installer's recommendations.
   1. In general, where cutting, use hand or small power tools designed for sawing or 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. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
   3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
   4. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating and backfilling.
   5. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible or to match existing where exposed for aesthetic appearance. Comply with specified tolerances. Patching will be done

utilizing tradesmen skilled for the surface to be patched. (e.g. mason for brickwork, ceramic tile installer for ceramic tile, etc)

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
2. 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. If patched area does not match the adjacent surface, the contractor will refinish the entire wall to achieve a uniform surface.
3. Where removal of walls or partitions extends one finished area into another, patch and repair floor, ceiling and wall surfaces in the new space. Provide an aligned, flush surface of uniform color and appearance. Provide grinding, leveling and/or self-leveling of surfaces since adjacent room surfaces may vary in elevation. Remove existing floor and wall coverings and ceiling materials and replace with new materials, if necessary, to achieve uniform color and appearance.
    a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat.
4. Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.04 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 primer and paint or other finishing materials. Restore damaged pipe covering to its original condition

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Cleaning during the progress of the work.

B. Maintain all premises and public properties/roadways free from accumulations of waste, debris, dirt, mud and rubbish caused by operations on a daily basis.

C. At completion of work, remove waste materials, rubbish tools, equipment, machinery and surplus materials, and clean all exposed surfaces; leave project clean, dust free and ready for occupancy,

D. Remove all overspray caused by construction operations from adjacent construction, surfaces and vehicles.

E. Cleaning prior to final payment

1.02 SCHEDULING

A. Sequence, schedule, and coordinate final cleaning work with the final cleaning work to be performed by other contractors.

1.03 SAFETY REQUIREMENTS

A. Standards: Maintain project in accord with OSHA and other applicable safety and insurance standards.

B. Hazard Control / Cleaning Products:
   1. Store volatile organic containing / flammable waste in covered metal containers and remove from premises daily.
   2. Provide adequate ventilation during use of VOC containing or noxious substances.

C. Conduct cleaning and disposal operations to comply with local ordinances, OTC regulations and local anti-pollution laws and ordinances.

D. Dispose of all waste legally, off-site.

E. Do not dispose of VOC / flammable waste such as mineral spirits, oil, or paint thinners into storm or sanitary drains.

F. Do not burn or bury rubbish and waste materials on project site.

G. Do not dispose of any waste into surface waters such as ponds, lakes, streams or waterways

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cleaning materials shall be appropriate to the surface and materials being cleaned.

B. Materials: Use only cleaning materials recommended by manufacturer of surface to be cleaned

C. Provide pads to protect finished surfaces from cleaning materials.

PART 3 - EXECUTION

3.01 PREPARATION

A. Post signs to advise building occupants if wet and/or slippery floor conditions exist during cleaning operations.

3.02 PROGRESS CLEANING

A. Keep all buildings, enclosures, and confined areas where work is being performed under the Contract free from unattended combustible materials.

B. Remove rust spots as they develop.

C. Execute daily cleaning to ensure that building, grounds, and public properties and roadways are maintained free from accumulations of waste materials, rubbish, dirt, mud and dust.

D. Wet down dry materials and rubbish to lay dust and prevent blowing dust.

E. Each day, each contractor shall adhere to the following:

1. Areas of intense activity, such as cutting and sawing must be swept clean and reorganized at the end of each day. Utilize dust control methods such as plastic containment enclosures and/or wetting of surfaces.
2. Areas of moderate activity, such as installation of plumbing, ductwork, electrical work, must be returned to operating / safe order at the end of each day.
3. Debris below scaffolds including areas of shoring and re-shoring, must be kept sufficiently cleared and consolidated to keep walkways free of tripping hazards at all times. These work areas must also be swept clean immediately after removal of scaffolds, shoring, etc.
4. All swept up debris, waste materials, and packing must be removed and placed in a dumpster by the end of the workday.
5. All stored material must be protected and kept in good order.
6. As portions of the work are completed, all used and excess materials shall be removed promptly.
7. Daily Clean-up and good housekeeping is the responsibility of each contractor individually and will be monitored by the Owner's Construction Representative. If any contractor fails to perform cleaning when directed or does not properly clean within 4 hours of being notified by Owner's Construction Representative, the Owner will hire others and charge the responsible contractor accordingly.
8. Contractors shall promptly comply with requests to organize scattered materials.
9. Daily sweep and weekly damp mop of all work areas.

F. Each Contractor is responsible for furnishing dumpsters or other such containers as required for collection, storage and legal disposal of all debris and rubbish resultant from their individual construction operations (both demolition and daily construction debris). The Owner's Construction Representative shall direct contractors to locate, maintain and move such containers as necessary and legally dispose of waste as containers are filled. Each contractor shall separate and recycle waste as required by authorities, contract requirements and local regulations / ordinances.

G. The General Construction Contractor shall vacuum clean areas when ready to receive finish painting, and continue vacuum cleaning, on an as needed basis, until the building(s) is (are) ready for Substantial Completion.

H. Handle materials in a controlled manner to reduce handling to the extent possible. Do not drop or throw materials from heights.

I. Schedule cleaning operations so that dust and other containment resulting from cleaning process will not fall on wet, newly painted surfaces.

3.03 FINAL CLEANING

A. Remove dust, dirt, grease, stains, paint drips and runs, plastic, labels, tape, glue, rope, and other foreign materials from visible interior and exterior surfaces.

B. Do not move dust from spot to spot. Remove directly from the surface on which it lies by the most effective mean such as appropriately treated dusting cloths or vacuum tools. When doing high cleaning, do not allow dust to fall from high areas onto furniture and equipment below.

C. Dismantle and remove all temporary structures, scaffolding, fencing, and equipment. Remove waste materials, rubbish, lumber, block, tools, machinery, and surplus materials.

D. Perform the following prior to final payment:
1. Broom clean all exterior concrete surfaces and vacuum clean all interior concrete surfaces.
2. Dust and spot clean painted and vinyl covered walls.
3. Clean and polish all unpainted metal on doors such as trim, hardware, kickplates and doorknobs.
4. Vacuum clean carpets and mats.
5. Vacuum clean acoustic ceilings.
6. Repair, patch, and touch-up marred surfaces to specified finish and to match adjacent surfaces.
7. Remove foreign material from masonry.

8. Replace all broken and scratched glass and mirrors.
9. Wash and clean interior and exterior window surfaces. All glass shall be clean and free of dirt, grime, streaks and excessive moisture. Wipe drippings and other marks from windowsills, sashes and woodwork. Do not use windowsills in lieu of ladders.
10. Polish bright metal by damp wiping and drying with a suitable cloth. If a polished appearance is not thereby produced, apply appropriate metal polish.
11. Clean and polish all stainless steel surfaces, including control panels supplied under this Contract.
12. Clean furniture and equipment in accordance with manufacturers instructions.
13. Clean all paved roads, lots and drives which were paved as work under this Contract and all existing paved surfaces using a mechanical street cleaner.
14. Repair or repaint damaged pavement markings.
15. Vacuum and clean with a damp cloth light fixtures, including glass and plastic lenses, ceiling and wall mounted lights, cover panels, side panels, louvers, fixture frames and lamps.
16. Clean supply vents and exhaust grilles.
17. Remove all rust spots and stains from new and pre-existing concrete, painted surfaces, and all other surfaces.
18. Clean and disinfect all pre-existing toilet facilities that were entered upon and used by the Contractor during the project.
19. Wash all existing floors that were in any way impacted by the construction operations.
20. Rake clean landscaped surfaces. Final mow all areas grassed and sodded during the work.
21. Inspect interior and exterior surfaces, and all work areas, to verify that the entire work is clean and ready for use by the Owner. The project will not be considered substantially complete until all final cleaning has been performed.
22. Polish all new handrail installed as work of this contract with a commercially available aluminum cleaner recommended by the railing manufacturer.
23. Clean dirt that has accumulated between grating and grating angles/supports.
24. Vacuum the inside of all control panels provided under this Contract after the panel has been wired.
25. Fill in all holes in concrete that remain after temporary handrail is removed. Non-shrink grout shall be used.
26. Magnet sweep all exterior lawn and walkway areas to ensure that stray nails / screws, etc. remain in lawn areas nor on walkways.

3.04 RUBBISH REMOVAL

A. A. Contractors shall comply with all Local, State and Federal Laws, Codes and Requirements regarding recycling and trash or rubbish removal.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work of this Section includes the following:
   1. Starting systems
   2. Testing, adjusting, and balancing
   3. Updating of manufacturer's operations and maintenance manuals and wiring diagrams

B. Work of this Section also includes stipulated man-hours that shall be provided by the **Prime Electrical Construction Contractor** for startup participation of equipment and systems.

1.02 STARTING SYSTEMS

A. The Contractor shall coordinate, schedule, and sequence the start-up of various equipment and systems.

B. Where the start-up of a system or piece of equipment is dependent upon the start-up of other system(s) or equipment, then the Contractor shall schedule and sequence the start-ups to coincide.

C. Notify the Architect/Engineer at least 14 calendar days prior to the start-up of each item or system so that he can schedule the startup with the Owner and utilities.

D. Where applicable, verify that each piece of equipment or system has been checked for proper:
   1. lubrication,
   2. drive rotation,
   3. belt tension,
   4. motor starter heater size,
   5. fuse size,
   6. water pressures,
   7. terminal connections,
   8. control sequence,
   9. for conditions which may cause damage or delay the start-up procedure.

E. Verify that the equipment has been installed in accordance with the manufacturer's requirements.

F. Complete all pre-startup checklists that may be required by the system vendor.
   1. In the event that start-up activities are delayed as a result of the Contractor's failure to properly check the completed installation and a manufacturer's representative is on the job site waiting for corrections to be made, then the Architect/Engineer may, at his/her sole discretion, postpone start-up until such time as the corrections have been made without any extra costs.
   2. The Owner may deduct from money due the Contractor the excess cost of engineering associated with having the Architect/Engineer present during the start-up.
   3. The deduction shall be equal to the Architect/Engineer's effective billing rate times the total number of hours delayed during the start-up activities.

G. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

H. Verify that wiring and support components for equipment are complete and tested.

I. Execute start-up under supervision of applicable Contractor's personnel in accordance with manufacturer's instructions.

J. The Contractor shall have the job site superintendent present during all start-up activities.

K. Provide manufacturer's authorized technician at the site when specified and in accordance with the requirements contained in Section 014500 - Quality Control.

L. Submit manufacturer's start-up reports (MSR's) in accordance with Section 013300.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUBMITTALS

A. Submit the following documents to the Architect/Engineer before Substantial Completion:
   1. Project Record Documents as specified in Section 017839 - PROJECT RECORD DOCUMENTS.
   2. Operations and Maintenance Manuals prepared in accordance with Section 017823 - OPERATING AND MAINTENANCE DATA and be updated as a result of start-up activities.
   3. Manufacturer's Start-up Reports (MSR's) for all equipment and systems where manufacturer field time is specified.
      a. Each MSR shall be signed by the field technician(s) who attended the start-up.
      b. If the manufacturer is taking exception to the installation or if the warranty is voided, he shall provide a statement to that effect and provide reasons and justification to explain the company's position.
   4. One binder containing original counterparts of all warranties, guarantees, bonds, or affidavits as specified in the Technical Specification Sections. These documents shall contain the original signatures and be placed in a plastic sheet protector, one document per protector.
   5. Spare parts checklist itemizing all spare parts furnished under the Contract summarized by Section.
   6. Electrical Underwriter's Certificate where the prime construction contract includes electrical construction or where this Contract is for a Prime Electrical Construction Contract.

B. Submit the following items to the Architect/Engineer with the final application for payment:
   1. Final Application for Payment and continuation (G702 and G703)
   2. Contractor's Certified Payrolls
   3. OSHA cards for all workers
   4. Contractor's Affidavit of Payment of Debts and Claims (G706)
   5. Contractor's Affidavit of Release of Liens (G706A)
   6. Final list of Subcontractors (G705)
   7. Subcontractor's Affidavit of Payment of Debts and Claims (G706) - (for each subcontractor used)
   8. Subcontractor's Affidavit of Release of Liens (G706A) - (for each subcontractor used)
   9. Consent of Surety to Final Payment (G707)
   10. 2 year Maintenance Bond - 100% of contract including change orders
   11. Contractors letter guaranteeing workmanship 2 years
   12. Product data, Maintenance manuals and Warranty Information
   13. As Built Documentation
   14. Attic Stock / Spare Parts (provide proof of delivery transmittal signed by owner)
   15. Training and Demonstrations (provide sign-in from training session)
   16. Asbestos Affidavit and waste manifests

C. All documents shall be complete, signed, dated, and notarized (where applicable) and be subject to the Architect/Engineer's acknowledgment of receipt or approval.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section specifies the requirements for Operations and Maintenance Manuals required to be prepared by system suppliers and equipment manufacturers.

B. The Contractor shall submit Operations and Maintenance Manuals for all equipment.

C. Where the technical specifications call for the submission of manuals, said manuals shall be prepared in accordance with the requirements contained herein. It being understood that manuals shall be submitted for all equipment even if it is not specifically called out in the specifications.

1.02 MANUAL CONTENTS AND FORMAT

A. All Operations and Maintenance Manuals shall be as specified hereinafter.

B. The binder shall be 8 1/2" x 11", metal hinge, vinyl, large capacity by National or Equal. It shall show the name of the manufacturer or supplier and project name on the spine of the binder.

C. A cover shall be provided showing the names of the Owner, Architect/Engineer, Contractor, and Manufacturer.
   1. It shall show the Contractor's order number and manufacturer's project number.
   2. The address of the manufacturer, service station telephone number, project title, contract number, and year shall also be shown.

D. Provide tabbed color dividers for each separate product and system.
   1. The name of the product shall be typed on the tab.
   2. A separate tab shall also be provided for information such as troubleshooting instructions, spare parts list, etc.

E. An index shall be provided in the back of the binder, with a separate tab, providing a quick way for the operator to find key and important topics contained in the manual.

F. A separate listing for all charts, graphs, tables, figures and shop drawings shall be provided directly following the table of contents.

G. Each manual shall contain one (1) copy of all shop drawings deemed in compliance with the Contract Documents by the Architect/Engineer submitted for the equipment or system for which the manual is prepared.
   1. Only these shop drawings shall be included in the manual.
   2. All shop drawings larger than 8 1/2" x 11" shall be folded and placed in a heavy duty, top loading plastic sheet protector with the title of the drawing showing; one (1) drawing per protector page.

H. For systems being furnished with control panels, each manual shall contain a catalog cut for every electrical device installed inside the control panel or motor control center.

I. Where emergency generator(s) are included as work of this Contract, the manufacturer's standard manual will be allowed if the manual clearly shows the instructions for the particular model of generator. Cross out chapters and paragraphs that do not apply to the Owner's generator.

J. Each manual shall contain the following as a minimum:
   1. Table of contents
   2. Final version of the warranty statement approved by the Architect/Engineer
   3. Nameplate data of each component, year of installation, contract number and specification number
   4. Name, address and telephone number of the manufacturer and the manufacturer's local representative(s)
   5. Installation instructions
   6. Operation instructions including adjustments, the interrelation of components and the control sequence describing break-in, start-up, operation and shutdown
   7. Emergency operating instructions and capabilities

8. Maintenance requirements include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair and reassembly instructions; and alignment, adjusting, balancing, and checking instructions
9. Troubleshooting guide and corrective maintenance (repair) procedures for all electrical and mechanical equipment. These guides shall list the most frequent and common problems, together with the symptoms, possible causes of the trouble, and remedies
10. Drawings (pictures or exploded views) which clearly depict and identify each part, suitable for assembly and disassembly of entire system and each component
11. Wiring and control diagrams, if applicable
12. Panelboard circuit directories including electrical service characteristics, if applicable
13. Part list with current prices; ordering information; and recommended quantities of spare parts to be maintained in storage
14. Charts of valve tag numbers, with location and function of each valve, keyed to the process and instrumentation diagram prepared as part of the Contract Documents
15. Name, address, and telephone number of nearest parts supply house and nearest authorized repair service center.
16. List of recommended spare parts and the recommended number of each per unit and per group of units.

K. All electronic Operations and Maintenance Manuals shall be as specified hereinafter.
1. All files shall be in Adobe PDF format and submitted on compact discs.
2. Files shall be organized by specification section and then by product.
3. An electronic index and list of all charts, graphs, tables, figures, and shop drawings shall be included.
4. All information provided in the paper Operations and Maintenance Manual shall be included in the electronic version.

L. Submit two (2) copies of a preliminary draft manual at least fourteen (14) calendar days prior to the date set for start-up.
1. The Architect/Engineer will review the manual for content and compliance with these specifications.
2. Written comments will be provided, but the manual will not be returned.
3. One (1) manual will be used at start-up, to record changes that should be made to the final manual.
4. This copy of the manual will be retained on the site until such time as the final, updated manual is provided.

M. Two (2) weeks after the date the unit was placed into service and the Owner has gained beneficial use, submit five (5) copies of the final updated Operations and Maintenance Manual. Refer to Section 017500 - STARTING AND ADJUSTING for requirements related to updating the manual(s).

N. Where installation instructions are not included with the manual, they shall be shipped at least ten (10) days prior to the date the equipment is scheduled for installation.

1.03 RETAINAGE

A. The Architect/Engineer will retain from payment due the Contractor, for failure to submit manuals as specified, an amount equal to 2% of the scheduled value for the equipment or system for which the manual applies. This Contract requirement only applies when a manual is specified to be provided in the Technical Specifications for a particular system or piece of equipment.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 017823

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section includes:
   1. Maintenance of documents
   2. Recording of record information
   3. Submission of record documents

1.02 PLANS AND SPECIFICATIONS FURNISHED TO THE CONTRACTOR

A. Two (2) complete sets of Contract Documents (plans, specifications and addenda) will be furnished to the Contractor.

1.03 MAINTENANCE OF DOCUMENTS

A. The Contractor shall maintain at the site one (1) set of the following: drawings, specifications, addenda, change orders, approved shop drawings, test reports, operation and maintenance manuals, and shop drawing log.

B. The Contractor shall make these documents available for use by the Owner, Architect/Engineer, regulatory agencies and other parties designated by the Owner.

C. Maintain these documents in a clean, dry, legible condition throughout the entire contract period.

1.04 RECORDING OF RECORD INFORMATION

A. Affix a stamp to each Contract Drawing and Shop Drawing reading as follows: "RECORD DOCUMENT" - "NAME OF PROJECT" - "CONTRACTOR NAME" in 2-inch high printed letters. The stamp shall be specifically prepared for this project.

B. Keep the record documents current as the work progresses. Record information concurrent with construction progress.

C. Shop Drawings: Maintain as record documents. Legibly mark-up to show changes made due to field conditions encountered during construction.

1.05 PROJECT RECORD DOCUMENTS

A. Maintain a complete and accurate log of control and survey work as it progresses.

1.06 SUBMITTAL OF RECORD DOCUMENTS

A. At Substantial Completion, the Contractor shall deliver one (1) preliminary record set of as-built documents to the Architect/Engineer with all changes conspicuously ballooned or otherwise emphasized.

B. The work will not be considered substantially complete until such time as the preliminary record documents are delivered and acceptable to the Architect/Engineer. Mark this set "Preliminary Record Drawings".

C. Prior to Final Completion, the Contractor shall conform the preliminary record drawings to the comments made by the Architect/Engineer. The Contractor shall provide one (1) set of full-scale paper as-built drawings and one (1) electronic copy in portable document format (PDF).

D. As-built drawings shall be the same size as the Contract Drawings, with 1/2-inch margins space on three sides and a 2-inch margin on the left side for binding.

E. Each drawing shall bear in the title box the words "FINAL RECORD DRAWINGS" and the name of the Contractor in heavy black lettering 1/2 inch high and be certified as complete and accurate.

F. As a convenience, Architect/Engineer will make available to the Contractor electronic media of the Contract Drawings for the sole purpose of the Contractor preparing as-built drawings.

G. Electronic media made available is without guarantee of compatibility with the Contractor's software or hardware.
   1. If the Contractor wishes to take advantage of this offer, the Contractor will be required to execute an indemnification and hold harmless agreement with the Architect/Engineer.

1.07 RELATED DOCUMENTS

A. Provide certificate of release of liens if requested by the Architect/Engineer.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The Section includes the requirements for delivering spare parts specified to be furnished under the provisions of the Contract Documents.

1.02 QUALITY ASSURANCE

A. Spare parts shall be delivered as complete assemblies direct from the manufacturer such that the part is fully functional and ready to be installed.

1.03 DELIVERY, STORAGE AND HANDLING OF SPARE PARTS

A. Comply with the requirements of Section 016500 for packing, delivery, storage and handling requirements for all parts delivered to the site of the work.

B. All spare parts required to be furnished under a Section of the Specifications shall be packaged in one separate box, crate or container with the words "SPARE PARTS" lettered on all sides of the container.

C. The equipment name or system name for which the spare parts are being provided shall also be lettered on the container.

D. A separate packing list for the spare parts shall be included in the container.

E. The Contractor shall store all spare parts indoors immediately upon delivery of the spare parts to the site. Spare parts will not be accepted by the Owner/Architect/Engineer if the spare parts have been stored outdoors for more than 8 hours upon delivery to the site.

F. The storage location shall be secure.

1.04 TURN OVER OF SPARE PARTS

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work of this Section includes the requirements for demonstrating and training of installed systems, equipment, and products.

B. Manufacturer field services and the credit for unused service time is also included herein.

1.02 MANUFACTURER'S FIELD SERVICES

A. When specified in individual specification sections require field services to be provided, said services shall be provided by qualified, authorized and factory trained representative(s) of the manufacturer (supplier).

B. Field services shall generally consist of:
   1. installation supervision,
   2. verify terms of the manufacturer's warranty,
   3. equipment and system calibration,
   4. startup supervision,
   5. and operation and maintenance instructions to the Owner's employees.

C. Such services do not include service time to correct a factory fault, correct problems resulting from a factory wiring or control logic error, or errors caused by poor or improper installation by the Contractor.

D. The time specified to be provided under the specification sections shall be exclusive of travel time to and from the facility or site. For the purposes of this Contract, one (1) day shall be defined as eight (8) hours exclusive of breaks or mealtime.

E. The times specified to be provided by the manufacturer does not relieve the manufacturer from providing sufficient service time to place the equipment or systems into satisfactory operation and to obtain the specified performance. The manufacturer shall provide, as a minimum, the times specified in the Specification Sections.

1.03 SUBMITTALS

A. The Contractor shall prepare a list of all manufacturer specified field time required by the technical specifications. Compile this summary listing and submit it to the Engineer for review in accordance with the requirements contained in Section 013300 - SUBMITTALS.

B. Manufacturer's Startup Reports

1.04 QUALITY CONTROL

A. The Contractor shall adhere to all instructions provided by the manufacturer's authorized representative.

B. All verbal instructions necessary to satisfy performance of the equipment or the system shall be immediately provided by the Contractor. The manufacturer shall document all verbal orders in writing at a time suitable to the Contractor.

C. All written instructions provided in operation, maintenance, and installation guides and manuals, provided by the manufacturer of such equipment and or system, shall be complied with by the Contractor.

D. The Contractor shall comply with all manufacturer requirements such that written or implied warranties remain in full force during the time period so specified elsewhere in the technical specifications.

E. Should manufacturer's instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

F. Actions and/or non performance by the Contractor that may void manufacturer warranties shall not constitute a release of the specified warranty, and all warranty claims made by the Owner shall be paid for by the Contractor as if the manufacturer's warranty was still in effect.

1.05 SCHEDULING - FIELD SERVICES

A. The Contractor shall arrange field service on dates acceptable to the Owner and Architect/Engineer.

B. The service visits shall be scheduled at least 2 weeks in advance so that the Owner and Architect/Engineer can adequately staff the date.

C. Operator training will not be allowed until such time as the Manufacturer's Operation and Maintenance Manuals have been supplied and approved by the Architect/Engineer.
   1. The field service technician shall review the contents of the manual with designated employees of the Owner.
   2. Field services will not be deemed provided until the MSR is provided.

1.06 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner's personnel prior to date of Substantial Completion.

B. Utilize manufacturer's and vendor's Operation and Maintenance Manuals as basis for instruction. Review contents of the manual with the Owner's personnel in detail to explain all aspects of operation and maintenance.

C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of the equipment or of the system.

D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

E. The Contractor shall arrange to have the manufacturer's Operation and Maintenance Manuals updated with information that has been added during start-up activities.

F. The final manual shall contain the most recent information and reflect all operational and maintenance aspects of the final installed and functioning system or equipment component of the system.

G. Any changes to control panel wiring diagrams or interconnection wiring schematics shall be made and new prints provided as an update to previously approved manuals.

H. Manufacturer field time shall be as specified in individual Sections of the Technical Specifications.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Removal of portable equipment from work areas.

B. Protection of existing equipment and building.

1.02 SCHEDULING

A. Schedule Work to coincide with other trades and availability of site access.

B. Complete new utility installations prior to connections to existing utilities.

C. Coordinate removal, storage and protection of equipment connected to electrical systems scheduled to be re-installed.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 PROTECTION OF EXISTING WORK

A. All existing structures, piping, utilities or materials stored in the existing building shall be protected against damage as may be required by the Architect/Engineer. The Contractor shall be responsible for any damage to the existing or installed works and appurtenances during construction operations and such damage shall be corrected by replacing the items damaged to their original condition and position at the Contractor's cost and expense and to the satisfaction of the Architect/Engineer.

3.02 PREPARATION

A. All portable equipment shall be removed from the area of the existing building indicated. Equipment shall be stored as directed by the Architect/Engineer.

B. Existing equipment which can not be removed from the building shall be protected from damage by the Contractor's operation. Walls, floor and equipment shall be adequately covered by plywood or other protective materials for the duration of the contract. No holes are permitted to be cut through the walls of the existing building, nor is the roof, any walls or other permanent part of the existing building to be removed to facilitate work under this Contract unless indicated otherwise. The Contractor shall protect existing water piping and water containing equipment from freezing.

C. All existing equipment in the existing building shall be protected from damage by the Contractor's operations.

D. The Contractor shall be required to restore the existing building and equipment to a condition equal to what it was prior to the Contractor starting work. Any equipment that is damaged shall be replaced at the Contractor's cost.

3.03 CLEANING UP

A. The Contractor shall keep the project site free from waste materials and rubbish during the progress of the work and shall make a thorough cleaning of the building and site when the work is completed. Cleaning shall be done to the satisfaction of the Architect/Engineer.

B. After completion of the contract, the Contractor will be required to clean up the site of all excavated materials and level off all excavations and dispose of all material as directed by the Architect/Engineer and leave the site in as good condition as at the beginning of the contract.

C. All material used to protect the existing building shall be removed. <> The existing building shall be restored to its prior condition and shall be left broom clean.

D. Buildings, grounds, paving, sidewalks, etc. shall be restored and left in a condition equal or better than that existing prior to the beginning of the work.

END OF SECTION 020100

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawing and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Asbestos Survey<> performed by Langan dated January 2025 consisting of 13 pages (Refer to Appendix 01 - A).

B. AHERA Surveillance Report performed by Environmental Consultants dated January 2023 consisting of 29 pages (Refer to Appendix 01 - B).

C. Related Sections include the following:
   1. Section 028200 - Asbestos Remediation.
   2. Section 028600 - Disposal of Hazardous Waste

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.
   2. Demolition and removal of selected site elements.
   3. Salvage of existing items to be reused or recycled.
   4. Recovery of Refrigerant materials.

B. Related Requirements:
   1. Section 011100 - SUMMARY OF WORK for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
   2. Section 311000 - SITE CLEARING for site clearing and removal of above- and below-grade improvements.

1.03 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.04 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.05 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.
   3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
   5. Review areas where existing construction is to remain and requires protection.
   6. Review procedures for turning over salvaged materials to the Owner and protected off-site storage of materials to be reused in the work of the project.

1.06 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting the public, pedestrian access and circulation areas and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.

3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Inventory: Submit a list of items to be removed, salvaged and delivered to Owner prior to start of demolition.

E. Pre-demolition Photographs and/or Video: Show existing conditions of adjoining existing construction and site conditions, including finish surfaces that could potentially be construed as having been damaged by Demolition activities. Submit two copies prior to commencing Demolition work.

F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

G. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.07 CLOSEOUT SUBMITTALS

A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.08 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.09 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use and is included in this Division of the specifications. Examine report and / or the appropriate specification section to become aware of locations where hazardous materials are present.
1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.

E. Storage or sale of removed items or materials on-site is not permitted.

1.10 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

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 perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
   1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
   2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
   1. Comply with requirements for existing services/systems interruptions specified in Section 011100 - SUMMARY OF WORK.

B. Existing Services/Systems to be removed, relocated, or abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
   1. Arrange to shut off indicated utilities with utility companies. Provide 5 days notice to the Architect prior to any utility shut-downs.
   2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
   3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
      a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap, plug or reconnect remaining piping with same or compatible piping material.
      b. Equipment to Be Removed: Disconnect and cap services and remove equipment.
      c. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug or reconnect remaining ducts with same or compatible ductwork material.

C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.03 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Comply with requirements for access and protection specified in Section 015000 - TEMPORARY FACILITIES AND CONTROLS.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building. Maintain existing required widths of egress pathways throughout.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
   3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   4. Cover and protect furniture, furnishings, and equipment that have not been removed.
   5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 - TEMPORARY FACILITIES AND CONTROLS.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
   1. Strengthen or add new supports when required during progress of selective demolition.

3.04 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain 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 demolition 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.

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.05 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 1 inch (25 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.06 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.07 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.08 SELECTIVE DEMOLITION SCHEDULE

A. Remove, store, relocate, salvage and protect the following materials and equipment:
   1. Existing Items to Be Removed: Items indicated on contract drawings and items listed in technical specifications sections.
   2. Existing Items to Be Removed, relocated and/or Salvaged: Items required to be removed, relocated salvaged and/or stored to complete the work as indicated or called for in these construction documents.

B. Existing Items to Remain: to complete and conform to the work of the project shall be as indicated on the contract drawings and items listed in the technical specification sections.

END OF SECTION

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Broad Scope: Asbestos containing materials (ACM) have been identified at the project site. Samples of various suspect materials have been collected and analyzed; additional samples may be required as existing materials are removed or revealed during the course of work. The scope of work and procedures outlined herein shall be followed by a New York State Department of Labor (NYS DOL) certified asbestos abatement contractor.

B. Related Sections:
   1. Section 022600 - HAZARDOUS MATERIALS ASSESSMENT.

C. SCOPE OF WORK
   1. Removal of the following items described in the asbestos survey as positive for asbestos, in accordance with NYSDOL Industrial Code Rule (ICR) 56:
      a. Interior VAT Floor Tile (9 inch by 9 inch) and mastic.
      b. Refer to construction drawings.
   2. Asbestos Containing materials must be removed only by a New York State Department of Labor (NYS DOL) licensed asbestos abatement contractor (herein referred to as the “Contractor”).
   3. The Contractor shall be aware of all conditions of the Project and is responsible for field verifying quantities and locations of all ACM to be removed from the building prior to submission of any bid. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work. The quantities presented in this Specification are approximate and should not be used solely as the basis for any bid. In the event that suspect materials not included in this Specification are encountered while the work is in progress, such material shall be tested for asbestos content or assumed positive for asbestos content, and removed in accordance with the procedures herein. Any discovery of new ACM shall not delay the progress of the Work. Payment for any additional work shall be considered on a case-by-case basis by the Engineer and Owner.
   4. All Work shall be performed in strict accordance with the Contract Documents and all applicable codes, rules, and regulations. Where conflicts occur between the Contract Documents and applicable codes, rules, and regulations, the more stringent shall apply.
   5. The Contractor's industrial hygiene practices during asbestos abatement will be monitored by the Owner’s representative. The Contractor shall be responsible for monitoring his own construction safety work practices for compliance with the OSHA regulations.

1.02 SPECIAL JOB CONDITIONS

A. Any special job conditions, including variances to be obtained by the Contractor, are described herein.
   1. The contractor MUST be certified for repairing of the Existing warrantied roof, since the overlaying roof is currently under warranty.
   2. The contractor shall be responsible for obtaining any site specific variances.

1.03 CODES, PERMITS AND COMPLIANCE

A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules, and regulations pertaining to Work practices, protection of workers, authorized visitors to the site, persons, and property adjacent to the Work.

B. Perform asbestos related Work in accordance with New York State Industrial Code Rule 56, 40 CFR 61, and 29 CFR 1926, as specified herein. Where more stringent requirements are specified, adhere to the more stringent requirements.

C. State Licenses: The Contractor must maintain current licenses pursuant to New York State Department of Labor and Department of Environmental Conservation for all Work related to this Project, including the removal, handling, transport, and disposal of asbestos containing materials.

1. The Contractor must have and submit proof upon request that any persons employed by the Contractor to engage in, or supervise Work on any asbestos Project have a valid NYS asbestos handling certificate pursuant to Industrial Code Rule 56.
2. The Contractor shall comply fully with the variances secured from regulatory agencies in the performance of the Work. The Contractor shall also be responsible for paying and complying with any additional variances. Should the Contractor choose to apply for any variance, approval from the Engineer is first required. In the event that the Contractor chooses to use more than one NYS Applicable Variance in the same Work Area simultaneously, the Contractor is responsible for complying with all conditions of each variance and any New York State Department of Labor (NYS DOL) interpretations concerning the use of these variances together.

D. Agency Notifications: The Contractor shall prepare written notification to EPA Region 2, and to the New York State Department of Labor (NYS DOL) at least 10 days prior to commencement of Work, when applicable. The Contractor shall be responsible for use and payment of any notifications required for performance of the Work.

E. It is the sole responsibility of the Contractor to determine what, if any patents are applicable to the Project. The Contractor shall pay all royalties and/or license fees. He/She shall defend all suits or claims for infringement of any patent rights and save the Owner, Architect, Engineer, and Construction Manager harmless from loss, including attorney's fees, on account thereof.

F. Before commencement of Work, the Contractor shall review and adhere to the Contract Documents. Failure to adhere to the Contract Documents shall constitute a breach of the Contract and the Owner shall have the right to and may terminate the Contract provided, however, the failure of the Owner to so terminate shall not relieve the Contractor from future compliance.

1.04 APPLICABLE STANDARDS AND REGULATIONS

A. The Contractor shall comply with the following codes and standards, except where more stringent requirements are shown or specified:

B. Federal Regulations:
1. 29 CFR 1910.1001, "Asbestos" (OSHA)
2. 29 CFR 1910.1200, "Hazard Communication" (OSHA)
3. 29 CFR 1910.134, "Respiratory Protection" (OSHA)
4. 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags" (OSHA)
5. 29 CFR 1926, "Construction Industry" (OSHA)
6. 29 CFR 1926.1101, "Asbestos, Tremolite, Anthophyllite, and Actinolite" (OSHA)
7. 29 CFR 1926.2, "Variances from safety and health standards" (OSHA)
8. 29 CFR 1926.500 "Guardrails, Handrails and Covers" (OSHA)
9. 29 CFR 1926.1200 "Confined Spaces in Construction" (OSHA)
10. 40 CFR 61, Subpart A, "General Provisions" (EPA)
11. 40 CFR 61, Subpart M, "National Emission Standard for Asbestos" (EPA)
12. 49 CFR 171-172, Transportation Standards (DOT)
13. 40 CFR Part 763, “Asbestos Hazard Emergency Response Act” (AHERA)

C. New York State Regulations:
1. 12 NYCRR, Part 56, "Asbestos", Industrial Code Rule 56 (DOL)
2. 6 NYCRR, Parts 360, 364, Disposal and Transportation (DEC)
3. 10 NYCRR, Part 73, "Asbestos Safety Program Requirements" (DOH)
4. New York State Department of Health (NYSDOH) Training Requirements

D. Standards and Guidance Documents:
1. American National Standard Institute (ANSI) Z88.2-80, Practices for Respiratory Protection
2. ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems
3. EPA 560/585-024, Guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book)

4. EPA 530-SW-85-007, Asbestos Waste Management Guidance

1.05 AUTHORITY TO STOP WORK

A. The Owner shall have the authority to stop the abatement work at any time a determination is made that conditions are not within Specification and applicable regulations. The stoppage of work shall continue until conditions have been corrected to the satisfaction of the Owner. Standby time to resolve the problems shall be at the contractor's expense.

1.06 SUBMITTALS

A. Pre-contract Submittals. After bids are opened, the apparent low bidder shall submit the following documentation, in accordance with the project deadlines outlined in the Contract Documents. Failure to submit all required documentation truthfully or in a timely manner may be cause for rejection of the bid.
   1. Contractor license issued by New York State Department of Labor.
   2. A list of Projects performed within the past two (2) years and include the dollar value of all Projects. Provide Project references to include Owner, consultant, and air monitoring firm's name, contact persons, address, and phone number.
   3. A standard operating procedures manual describing Work practices and procedures, equipment, type of decontamination facilities, respiratory program, special removal techniques, etc.
   4. Citations/Violations/Legal Proceedings: Submit a notarized statement describing:
      a. Any citations, violations, criminal charges, or legal proceedings undertaken or issued by any law enforcement, regulatory agency, or consultant concerning performance on previous abatement contracts. Briefly describe the circumstances citing the Project and involved persons and agencies as well as the outcome of any actions.
      b. Any litigation or arbitration proceedings arising out of performance on past Projects.
      c. Any liquidated damages assessed within the last 2 years.
   5. Preliminary Schedule: Provide an estimate of manpower to be utilized and the time required for completion of each major Work Area. Include estimated size and number of crews and work shifts.

B. Pre-Work Submittals. The Contractor shall submit 3 copies of the documents listed below, in accordance with the project deadlines outlined in the Contract Documents:
   1. Progress Schedule:
      a. Show the complete sequence of abatement activities and the sequencing of Work within each building or building section.
      b. Show the dates for the beginning and completion of each major element of Work including substantial completion dates for each Work Area, building, or phase.
   2. Notifications: As required by Federal, State and local regulatory agencies together with proof of transmittal (i.e. certified mail return receipt).
   3. Permits: As required by State and local regulations, including arrangements for storage, transportation, and disposal of contaminated material.
   4. Abatement Work Plan: Provide plans which clearly indicate the following:
      a. All Work Areas/containments numbered sequentially.
      b. Locations and types of all decontamination enclosures.
      c. Entrances and exits to the Work Areas/containments.
      d. Type of abatement activity/technique for each Work Area/containment.
      e. Number and location of negative air units and exhaust.
      f. Proposed location and construction of storage facilities and field office.
      g. Location of water and electrical connections to building services.
   5. Subcontractor List: List of all subcontractors to be used on the Project (i.e. Waste Hauler).
   6. Material Safety Data Sheets (MSDS): Copies of MSDS for each chemical or material used for the Project (encapsulant, surfactant, mastic remover, etc.).
   7. Laboratory: Submit the NYS Department of Health ELAP certification for the laboratory that will be analyzing the OSHA personnel air samples.

C. Project Close-out Submittal. Submit the following at the closeout of the Project:
   1. Copies of all waste disposal manifests, seals, and disposal logs.
   2. OSHA compliance air monitoring records conducted during the Work.
   3. Daily progress log.
   4. Entry and exit log.
   5. A list of each Worker used in the performance of the Project, including name, social security number, and New York State Department of Labor (NYS DOL) certification number.

1.07 HEALTH & SAFETY

A. Worker Protection: The Contractor shall comply with OSHA and provide and maintain all safety measures necessary to properly protect all individuals that enter the work area.

B. Emergency Actions: In an emergency affecting the safety of life, the work, or adjoining property, the Contractor shall immediately act in such a manner to prevent such threatened loss or injury.

C. Fire Protection, And Emergency Egress: The Contractor shall be responsible to the security and safeguarding of all areas turned over by the Owner to the Contractor. The Contractor shall designate to his workers and other building occupants the means of egress in case of emergency.

D. The Contractor shall establish emergency and fire exits from the work area. First aid kit, two (2) full sets of protective clothing and respirators shall be provided for use by qualified emergency personnel in the clean room of the decontamination facility.

E. Contractor shall provide fire watch and logbook throughout the entire term of the project, to protect against fire and unauthorized entry into and around the work area. Any intrusion or incident shall be documented in the logbook. Fire watch personnel shall be present during off-hours shift such as night shift, weekends and holidays when abatement work is not in progress. Fire watch shall be a certified asbestos handler by New York State Department of Labor (NYS DOL).

1.08 PRE-CONSTRUCTION CONFERENCE

A. Prior to start of preparatory Work under this Contract, and in accordance with the deadlines outlined in the Contract Documents, the Contractor shall attend a pre-construction conference attended by Owner, Facility Personnel, and Engineer, if requested.

B. Agenda for this conference shall include but not necessarily be limited to:
   1. Contractor's scope of Work, Work plan, and schedule to include number of Workers and shifts.
   2. Contractor's safety and health precautions including protective clothing and equipment and decontamination procedures.
   3. Owner & Engineer’s duties, functions, and authority.
   4. Contractor's Work procedures including:
      a. Methods of job site preparation and removal methods.
      b. Respiratory protection.
      c. Disposal procedures.
      d. Cleanup procedures.
      e. Fire exits and emergency procedures.
   5. Contractor's plan for twenty-four (24) hour project security both for prevention of theft and for barring entry of unauthorized personnel into Work Areas.
   6. Temporary utilities.
   7. Handling of furniture and other moveable objects.
   8. Storage of removed asbestos containing materials.
   9. Waste disposal requirements and procedures.

C. In conjunction with the conference, if requested, the Contractor shall accompany the Owner and/or Engineer on a pre-construction walk-through documenting existing condition of finishes and furnishings, reviewing overall Work plan, location of fire exits, fire protection equipment, water supply and temporary electric tie-in.

1.09 PROJECT MONITORING, AIR SAMPLING, AND INSPECTIONS

A. The Owner shall engage the services of an Environmental Consultant (the Consultant) or Engineer who shall serve as the Owner's Representative in regard to the performance of the asbestos abatement Project and provide direction as required throughout the entire abatement period.

B. The Contractor is required to ensure cooperation of its personnel with the Consultant/Engineer for the air sampling and project monitoring functions described below. The Contractor shall comply with all direction given by the Consultant/Engineer during the course of the Project.

C. The Consultant/Engineer shall provide the following administrative services:
   1. Review and approve or disapprove all submittals, shop drawings, schedules, and samples.
   2. Assure that all notifications to governmental agencies by the Contractor are submitted in a timely manner and are correct in content.
   3. Review and approve the Contractor's OSHA compliance testing laboratory.

D. The Consultant/Engineer shall provide abatement project air sampling and analysis as required by applicable regulations (New York State and/or AHERA). Sampling will include background, pre-abatement, during-abatement and clearance sampling.
   1. Unless otherwise required by applicable regulations, the Consultant shall have samples analyzed by Phase Contrast Microscopy (PCM) using NIOSH Method 7400. Results shall be available within 24 hours of completion of sampling.
   2. If the air sampling during abatement reveals airborne fiber levels at or above 0.01 fibers/cc or the background level (whichever is greater) outside the Work Area, then the Owner shall issue an immediate Stop Work order. The Contractor shall then inspect the barriers for leakage and HEPA vacuum and/or wet clean the surface outside the Work Area. The Contractor shall bear the burden of any and all costs incurred by this delay.
   3. Final air clearance sampling will be conducted by Transmission Electron Microscopy (TEM) in accordance with 40 CFR Part 763 (AHERA), as applicable.

1.10 CONTRACTOR AIR SAMPLING

A. In addition to the requirements of OSHA 1926.1101, the Contractor shall be required to perform personal air monitoring every Work shift in each Work Area during which abatement activities occur in order to determine that appropriate respiratory protection is being utilized (OSHA Monitoring).

B. The Contractor shall conduct air sampling that is representative of both the 8-hour time weighted average and 30-minute short-term exposures to indicate compliance with the permissible exposure and excursion limits.

C. The Contractor's laboratory analysis of air samples shall be conducted by an New York State DOH ELAP approved laboratory.

1.11 WORK SUPERVISION

A. The Contractor shall designate a full-time Project Supervisor who shall meet the following qualifications:
   1. The Project Supervisor shall hold New York State certification as an Asbestos Supervisor.
   2. The Project Supervisor shall meet the requirements of a "Competent Person" as defined by OSHA 1926.1101 and shall have a minimum of one year experience as a supervisor.
   3. The Project Supervisor must be able to read and write English fluently, as well as communicate in the primary language of the Workers.

B. If the Project Supervisor is not on-site, all Work shall be stopped. The Project Supervisor shall remain on-site whenever asbestos removal is being performed. The Project Supervisor cannot be removed from the Project without the written consent of the Owner and the Engineer.

C. The Project Supervisor shall maintain the Project Log Book required by New York State Department of Labor and Section 2.03 of the specifications and the Waste Disposal Log required by Section 4.04 of the specifications.

D. The Project Supervisor shall be responsible for the performance of the Work and shall represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the Asbestos Project Monitor.

1.12 DELIVERY AND STORAGE

A. Deliver non-contaminated materials to the job site in original packages with containers bearing manufacturer's name and label.

B. Store all materials at the job site in a suitable and designated area.
   1. Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.
   2. Protect materials from unintended contamination.

C. Remove damaged or deteriorated materials from the job site. Materials contaminated with asbestos shall be disposed of as asbestos debris as herein specified.

1.13 TEMPORARY UTILITIES

A. Shut down and lock out all electrical power to the asbestos Work Areas.

B. Provide temporary 120-208 volt, single phase, three wire, 100 amp electric service with Ground Fault Circuit Interrupters (GFCI) for all electric requirements within the asbestos Work Area.
   1. Where available, obtain from Owner's existing electrical system. Otherwise provide power from other sources (i.e. generator).
   2. Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all HEPA equipment and tools.
   3. Provide adequate "weatherproof" receptacles, to incorporate use by the APM for air sampling equipment.
   4. All power to the Work Area shall be brought in from outside the area through GFCI's at the source.

C. Provide temporary lighting with "weatherproof" fixtures for all Work Areas including decontamination chambers.
   1. The entire Work Area shall be kept illuminated at all times work is in progress.
   2. Provide lighting adequate for the purposes of performing required inspections.

D. All temporary devices and wiring used in the Work Area shall be capable of decontamination procedures including HEPA vacuuming and wet-wiping.

E. Utilize domestic water service, if available, from Owner's existing system. Provide hot water heaters with sufficient capacity to meet Project demands.

PART 2 - PRODUCTS

2.01 PROTECTIVE CLOTHING

A. Provide personnel utilized during the Project with disposable protective whole body clothing, head coverings, gloves and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber for comfort, but shall not be used alone. Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape, or provide disposable coverings with elastic wrists or tops.

B. Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete disposable outfits per day for each individual performing abatement Work.

2.02 DISPOSAL BAGS, DRUMS, AND CONTAINERS

A. Provide 6 mil polyethylene disposal bags printed with asbestos caution labels. Bags shall be imprinted with U.S. Department of Transportation required markings.

B. If the asbestos waste has the potential to damage or puncture the disposal bags, burlap sacks shall be utilized as a liner inside the polyethylene disposal bags to prevent puncture or damage to the disposal bags. In addition, 30 or 55 gallon capacity fiber or metal drums capable of being sealed air and water tight may also be used. Affix asbestos caution labels on lids and at one-third points around drum circumference to assure ready identification.

C. Containers and bags must be labeled with the names of the waste generator and the location at which the waste was generated in accordance with 40 CFR Part 61 NESHAPS.

D. Labeled ACM waste containers or bags shall not be used for non-ACM waste or trash. Any material placed in labeled containers or bags, whether turned inside out or not shall be handled and disposed of as ACM waste.

2.03 HEPA VACUUM EQUIPMENT

A. All dry vacuuming performed under this contract shall be performed with High Efficiency Particulate Absolute (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.

B. Provide tools and specialized equipment including scraping nozzles with integral vacuum hoods connected to a HEPA vacuum with flexible hose.

2.04 POWER TOOLS

A. Any power tools used to drill, cut into, or otherwise disturb asbestos material shall be equipped with HEPA filtered local exhaust ventilation.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Should the area beyond the Work Area(s) become contaminated with asbestos containing materials or elevated fiber levels, immediately stop Work and institute emergency procedures. Contaminated non-Work Areas shall be isolated and decontaminated in accordance with procedures established for asbestos removal. All costs incurred in decontaminating such non-Work Areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.

B. New York State (NYS) DOL certificates shall be on site prior to admittance of any Contractor's employees to the asbestos Work Area.

C. Perform all asbestos removal Work using wet removal procedures. Dry removal procedures are not permitted.

D. The following documents shall be posted at the site at an easily accessible location:
   1. Company Asbestos Abatement license.
   2. Worker's asbestos handling certificates (copies are acceptable provided Workers have original certificates in their possession).
   3. Project specifications.
   4. Project drawings.
   5. Notifications and variances.
   6. Applicable regulations.
   7. Material Safety Data Sheets.
   8. Abatement Work plan.
   9. List of emergency telephone numbers.
   10. Waste Disposal Log.

E. The Work Area must be vacated by building occupants prior to decontamination enclosure construction and Work Area preparation.

3.02 PERSONNEL DECONTAMINATION ENCLOSURE

A. Full (five room) Decontamination Facility: The Contractor shall provide a full decontamination enclosure system for large asbestos projects in accordance with OSHA Standard 29 CFR 1926.1101 and 12NYCRR Part 56 (ICR 56).

B. Remote Decontamination Facility: The Contractor shall provide a remote personnel decontamination enclosure system for small asbestos projects, asbestos projects that utilize multiple tents, and exterior asbestos roof projects in accordance with OSHA Standard 29 CFR 1926.1101 and 12NYCRR Part 56 (ICR 56).

C. Decontamination Enclosure System Utilities: Lighting, heat, and electricity shall be provided as necessary by the Contractor.

3.03 WASTE DECONTAMINATION ENCLOSURE

A. Waste/Equipment Decontamination Enclosure System: This system is located adjacent to the work area and personnel decontamination system. If the decontamination chamber is accessible to the public it shall be fully framed and sheathed to prevent unauthorized entry. A remote decontamination unit may be used that complies with subpart 56-9 of NYS Industrial Code Rule 56 of Title 12, section 30 of the Labor Law. This remote enclosure system must be on the property and stationary, within 50 feet of the building.

B. Where only one egress from the Work Area exists, the holding area of the waste decontamination enclosure system may branch off from the personnel decontamination enclosure equipment room, which then serves as the waste wash room.

C. The waste wash room water shall be drained, collected, and filtered as specified in 12NYCRR Part 56 (ICR 56).

D. In small asbestos projects where only one egress from the Work Area exists, the shower room may be used as a waste washroom. In this instance, the clean room shall not be used for waste storage, but shall be used for waste transfer to carts, which shall immediately be removed from this enclosure.

3.04 WORK AREA ENTRY AND EXIT PROCEDURES

A. Personnel Entrance and Decontamination Procedures for Gross Removal Operations utilizing full decontamination facility, the following entry/exit procedures shall be used for gross removal using full containment:

1. All workers and authorized visitors shall enter the work area through the worker decontamination enclosure system.
2. All individuals who enter the work area shall sign the entry log, located in the clean room, upon each entry and exit. The log shall be permanently bound and shall identify fully the facility, agents, contractor(s), the project, each work area and worker respiratory protection employed. The site supervisor shall be responsible for the maintenance of the log during the abatement activity.
3. Each worker or authorized visitor shall, upon entering the job site, remove street clothes in the clean room and put on a clean respirator (with new filters, if appropriate) and clean protective clothing before entering the work area through the shower room and equipment room.
4. Each worker or authorized visitor shall, each time he/she leaves the work area: remove gross contamination from clothing before leaving the work area; proceed to the equipment room and remove all clothing except the respirator; still wearing the respirator, proceed to the shower room; clean the outside of the respirator with soap and water while showering; remove filters, wet them, and dispose of them in the container provided for that purpose; wash and rinse the inside of the respirator; and thoroughly shampoo and wash himself/herself.
5. Following showering and drying off, each worker or authorized visitor shall proceed directly to the clean room, dress in street clothes, and exit the decontamination enclosure system immediately. Disposable clothing of the type worn inside the work area is not permitted outside the work area.

B. Personnel Entrance and Decontamination Procedures for Removal Operations utilizing remote decontamination facility: The following entry/exit procedures shall be used for removal work areas.

1. All individuals who enter the Work Area shall sign the entry log, located in the clean room, upon each entry and exit. The log shall be permanently bound and shall identify fully the facility, agents, contractor(s), the project, each Work Area, and worker respiratory protection employed. The job supervisor shall be responsible for the maintenance of the log during the abatement activity.
2. Each worker shall remove street clothes in the clean room; wear two disposable suits, including gloves, hoods and non-skid footwear; and put on a clean respirator (with new filters) before entering the work area.

3. Each worker shall, before leaving the work area or tent, shall clean the outside of the respirators and outer protective clothing by wet cleaning and/or HEPA vacuuming. The outer disposable suit shall be removed in the work area and the worker shall then proceed to the shower room. The inner disposable suit and respirator shall be wet wiped and HEPA vacuumed thoroughly before removing and prior to aggressive shower.
4. Following showering and drying off, each worker or authorized visitor shall proceed directly to the clean room, dress in street clothes, and exit the decontamination enclosure system immediately.

3.05 WORK AREA PREPARATION

A. Work Area preparation shall be performed in accordance with 12NYCRR Part 56 (ICR 56), the Contract Documents and the approved Asbestos Work Plan.

B. Temporary lighting within the work area and decontamination system shall be provided as required to achieve minimum illumination levels.

C. Unless otherwise specified for removal, the Contractor shall either protect all fiberglass insulation on piping, ductwork, tanks, etc. in the Work Area using two layers of six mil polyethylene or remove the insulation as asbestos containing waste. If the Contractor elects to remove the fiberglass insulation, he/she shall be responsible for reinsulation, if reinsulation of removed ACM is part of the Contract or Project.

D. Emergency exits. Emergency exits and routes shall be established and clearly marked with florescent paint or other effective designations to permit easy location from anywhere within the work area. Emergency exits shall be secured to prevent access from uncontaminated areas and yet permit emergency exiting. Exits shall be checked daily against exterior blockage or impediments to exiting.

E. Remove all items attached to or in contact with ACM only after the Work Area enclosure is in place. HEPA vacuum and wet wipe with amended water all removed items prior to their removal from the Work Area and before the start of asbestos removal operations.

F. If, required, suspended ceiling tiles shall only be removed after Work Area preparation is complete. Non-contaminated ceiling tiles shall be HEPA vacuumed and removed from the Work Area before asbestos removals begin. Contaminated ceiling tiles shall be disposed of as asbestos waste.

G. For tent enclosures: the Contractor shall use negative pressure ventilation equipment to continuously exhaust the enclosed area. A minimum of two (2) volume changes per hour is required. All required air monitoring must be successfully completed before the tent/barrier is collapsed.

3.06 NEGATIVE AIR PRESSURE FILTRATION SYSTEM

A. Provide a portable asbestos filtration system that develops a minimum pressure differential of negative 0.02 in. of water column within all full enclosure areas relative to adjacent unsealed areas and that provides a minimum of 4 air changes per hour in the Work Area during abatement.

B. The system shall include a series of pre-filters and filters to provide High Efficiency Particulate Air (HEPA) filtration of particles down to 0.3 microns at 100% efficiency and below 0.3 microns at 99.9% efficiency. Provide sufficient replacement filters to replace pre-filters every 2 hours, secondary pre-filters every 24 hours, and primary HEPA filters every 600 hours of operation.

C. At no time will the unit exhaust indoors, within 50 feet of a receptor, including but not limited to windows and doors, or adversely affect the air intake of the building.

D. The Contractor shall provide either a manometer or a photohelic style negative air pressure gauge with chart recorder to measure and record negative pressure differential across the Work Area barriers without interruption 24 hours per day as directed by the Environmental Consultant.

E. There shall be at least a 12-hour settling period after the Work Area is fully prepared and the negative filtration units have been started to ensure integrity of the barriers. Unless otherwise specified in the variance(s) utilized by the contractor.

3.07 REMOVAL OF ASBESTOS CONTAINING MATERIALS

A. Asbestos-containing materials shall be removed in accordance with 12NYCRR Part 56 (ICR 56), the Contract Documents and the approved Asbestos Work Plan.

B. Sufficiently wet asbestos materials with a low pressure, airless fine spray of surfactant to ensure full penetration prior to material removal. Re-wet material that does not display evidence of saturation.

C. One Worker shall continuously apply amended water while ACM is being remove

D. Perform cutting, drilling, abrading, or any penetration or disturbance of asbestos containing material in a manner to minimize the dispersal of asbestos fibers into the air. Use equipment and methods specifically designed to limit generation of airborne asbestos particles. All power operated tools used shall be provided with HEPA equipped filtered local exhaust ventilation.

E. Power or pressure washers will not be allowed to be used for asbestos removal or clean-up procedures.

3.08 ACM WASTE CONTAINERIZING, DECONTAMINATION AND LOAD OUT PROCEDURES

A. Packaging of ACM shall conform to OSHA Standard 29 CFR 1926.1101, DOT 49 CFR 171, 172, and 173, and EPA Standard 40 CFR Part 61 and the requirements as herein specified. Materials to be transported through a non-Work area building space shall be placed in hard wall shipping containers for handling.

B. The cleaned containers of asbestos material and equipment shall be placed in water tight carts with doors or tops that shall be closed and secured. These carts shall be held in the holding area pending removal. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.

C. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.

D. Where the waste removal enclosure is part of the personnel decontamination enclosure, waste removal shall not occur during shift changes or when otherwise occupied. Precautions shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room.

3.09 WORK AREA CLEANING PROCEDURES

A. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, decontamination procedures shall be followed as specified in ICR 56, unless otherwise stated in the variance(s) utilized by the Contractor.

B. Following each decontamination procedure (i.e., first, second, and third cleanings) the APM shall inspect the Work Area for effectiveness of the cleanings. If necessary, additional cleaning shall be performed by the Contractor as directed by the APM.

C. As a result of any air sampling results that indicate high fiber levels, the Contractor will clean or reclean the affected areas at no additional expense to the Owner.

3.10 TENT ENCLOSURES

A. Tent enclosures may only be used in areas specifically permitted by New York State (NYS) Code Rule 56 or a Project specific variance issued by the New York State (NYS).

B. The Contractor shall restrict access to the immediate area where tent removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.

C. Remote personnel and waste decontamination enclosures shall be constructed. Configuration shall be as required by Project size.

D. During removal activity, a HEPA vacuum or small capacity negative pressure filtration unit shall be used to provide a negative air pressure inside the tent. A minimum of six air changes per hour is required.

E. Workers shall wear two disposable suits for all phases of Work. Workers exiting the tent shall HEPA vacuum the outer suit, enter the airlock, remove the outer suit and then place it back into

the Work Area. A clean second suit shall be donned before exiting the airlock and proceeding to the decontamination enclosure or another tent.

F. ACM removal shall follow procedures defined in Article 3.07.

G. Waste material shall be placed in properly labeled 6 mil plastic bags or other appropriate containers. The outside of the bags or containers shall be wet wiped and/or HEPA vacuumed before being passed into the airlock for double- bagging. The bags or containers shall then be transported to the decontamination enclosure and then bagged for a third time and transported to the waste storage container. All transportation of waste bags and containers outside the Work Area shall be in watertight carts.

H. The APM shall conduct a visual inspection of the Work Area for cleanliness and completion of abatement.

3.11 GLOVEBAG REMOVAL

A. Glovebag removals may only be used as specifically permitted by New York State (NYS) Code Rule 56 , Applicable Variance 108 (AV 108) Glovebag Operations, or a Project specific variance issued by the New York State (NYS) Department of Labor. Glovebags may only be used on piping.

B. As specified in applicable regulations and variances, glovebag removals are only permitted to be conducted within tent enclosures complying with these specifications. Removal and disposals must also be conducted in conformance with all Project variance conditions.

C. The Contractor shall restrict access to the immediate area where tent/glovebag removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.

D. Remote personnel and waste decontamination enclosures shall be constructed. Configuration shall be as required by Project size.

E. The glovebags shall be smoke tested by the APM before removal operations commence. Glovebags that do not pass the smoke test shall be resealed and then retested.

F. After glovebag removals are complete, tent decontamination procedures shall be followed.

3.12 RESTORATION OF UTILITIES, FIRESTOPPING, AND FINISHES

A. After final clearance, remove locks and restore electrical and HVAC systems. All temporary power shall be disconnected, power lockouts removed and power restored. All temporary plumbing shall be removed.

B. Finishes damaged by asbestos abatement activities including, but not limited to, plaster/paint damage due to duct tape and spray adhesives, and floor tile lifted due to wet or humid conditions, shall be restored prior to final payment, unless the damaged surfaces are to be replaced during renovation activities.
   1. Finishes unable to be restored shall be replaced under this Contract.
   2. All foam and expandable foam products and materials used to seal Work Area openings shall be completely removed upon completion of abatement activities.

C. All penetrations (including, but not limited to, pipes, ducts, etc.) through fire rated construction shall be firestopped using materials and systems tested in accordance with ASTM E814 on Projects where re-insulation is part of the required work.

3.13 ASBESTOS WASTE

A. Applicable Regulations: All asbestos waste shall be stored, transported and disposed of in accordance with the following regulations as a minimum:
   1. NYS DEC 6 NYCRRNYRCC part 360 and 364.
   2. US EPA NESHAPS 40 CFR 61.
   3. US EPA Asbestos Waste Management Guidance EPA/530-SW85.

B. Waste Storage Containers.

1. As work progresses, remove sealed and labeled bags of ACM from the Work area and place in a lockable trailer, dumpster, or other container approved for storage or transport of asbestos waste. Open containers will not be permitted on-site (i.e. open dumpster with canvas cover, etc.).
2. The container interior shall be plasticized and sealed with a minimum of two (2) layers of 6 mil polyethylene.
3. While on-site, the container shall be labeled with EPA Danger signage:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

4. The danger sign legend, text size, style and arrangement shall conform to the requirements of EPA Standard 40 CFR Part 61.149 (d) (1).
5. The New York State Department of Environmental Conservation Asbestos Hauler's Permit number shall be stenciled on both sides and back of the container.
6. Once the container is loaded at the site, the door(s) will be locked at all times.
7. Before the container is removed from the Project Site for transportation to the Disposal Site, the door(s) shall be locked. The locks shall be removed at the Disposal Site by the operator of the Disposal Facility.
8. The Owner may initiate random checks at the Disposal Site to insure that the procedures outlined herein are complied with.

3.14 DISPOSAL AND TRANSPORTATION OF ASBESTOS-CONTAMINATED WASTES

A. Sealed and labeled disposal bags or waste wrapped in two layers of plastic sheeting sealed airtight shall be used to transport asbestos-contaminated waste to the landfill. Procedures for hauling and disposal shall comply with 40 CFR, Part 61, 49 CFR, Part 171 and 172, and other applicable state, regional, and local government regulations.
   1. An asbestos waste shipment record or waste manifest shall accompany asbestos waste, which is transported to a disposal site.
   2. The waste manifest shall be completed by the Contractor.
   3. The waste manifest shall have the appropriate signatures of the APM, the Contractor, and the Hauler representatives prior to any waste being removed from the site.
   4. Copies of the completed waste manifest shall be retained by APM and the Contractor and shall remain on site for inspection. The Contractor shall forward originals of the waste manifest, which include final sign-off by the disposal facility, to Consultant/Engineer within 14 days of the waste container being removed from the site. Failure to do so may result in payment being withheld from the Contractor.

3.15 DISPOSAL SITE

A. The Contractor's Hauler and Disposal Site shall be approved by the Owner.

B. The Contractor shall have the Hauler provide the estimated date and time of arrival at the Disposal Site.

C. Unless specifically approved by the Owner, the Contractor shall not permit any off-site transfers of the waste or allow the waste to be transported or combined with any other off-site asbestos material. The Hauler must travel directly to the disposal site without unauthorized stops.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This specification covers the identification and disposal of hazardous waste, and related hazardous materials. Products shall be as follows or as directed by the Owner and or their representative. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Special Wastes:
   1. Asbestos-Containing Materials (ACM): ACM is regulated by EPA TSCA Rules, NY Code Rule 56 and OSHA standards, and is not Hazardous Waste.
   2. PCB Bulk Waste and non-liquid PCB materials (NLPCB): Window caulk and other caulk may contain NLPCB; if so, when disposed these materials are EPA-regulated PCB Bulk Waste under TSCA, and are NYS hazardous waste. PCB light ballasts are also to be disposed of as NYS Hazardous Waste. See Section 028400 for work involving PCB Containing Materials.

C. Scope of Work:
   1.

1.02 DEFINITIONS

A. Hazardous waste shall be any materials to be disposed that possess at least one of four characteristics, ignitibility, corrosivity, reactivity or toxicity, as defined and regulated by the Resource Conservation and Recovery Act (RCRA) and applicable state and federal regulations, or a material specifically identified as hazardous waste by applicable Federal or State lists, in 40 CFR 261 or 6 NYCRR 371.

B. A Conditionally Exempt Small Quantity Generator (CESQG) of hazardous waste shall be a waste handler who generates no more than 100 kilograms per month of listed and/or characteristic hazardous waste, generates no more than 1 kilogram of acute hazardous waste in any calendar month, and stores no more than 1000 kilograms of listed and/or characteristic hazardous waste or more than 1 kilogram of acutely hazardous waste.

C. A Small Quantity Generator (SQG) of hazardous waste shall be a waste handler who generates no more than 1000 kilograms per month of listed and/or characteristic hazardous waste, generates no more than 1 kilogram of acute hazardous waste per month, and stores no more than 6000 kilograms of listed and/or characteristic hazardous waste or more than 1 kilogram of acutely hazardous waste.

D. Large Quantity Generator (LQG) of hazardous waste shall be a waste handler who generates more than 1000 kilograms per month of listed and/or characteristic hazardous waste, generates more than 1 kilogram of acute hazardous waste per month, or stores more than 6000 kilograms of hazardous waste or 1 kilogram of acutely hazardous waste.

E. The Owner’s Consultant: The Owner shall provide a third-party consultant to provide pre-work assessments, project monitoring assessments for the construction procedures for the work area and surrounding areas and final clearance assessments. The Contractor shall be responsible for the worker protection requirements.

1.03 SUBMITTALS

A. Before start of work: At the pre-construction meeting, the Contractor shall submit the following to the Owner’s Representative for review:
   1. Copy of State or local license for hazardous waste hauler.
   2. Certificate of at least one on-site supervisor which has satisfactorily completed the OSHA 40 hour Health and Safety course for handling hazardous waste and spills.*
   3. Certificates of workers, which have successfully completed the OSHA 40-Hour Health and Safety Course for Hazardous Waste and spills.*
   4. List of the employees scheduled to perform this work.
   5. Schedule of start and finish times and dates for this work.

6. The name, address and EPA ID No. of the disposal facility where these waste materials are to be received. Include contact person, a copy of the facility permit and telephone number.
7. The facility permit must identify the waste material(s) to be received, and must be accompanied by a statement that the facility has the capacity and authority to accept the waste. Land Disposal Restriction (LDR) forms must also be provided.
8. Material Safety Data Sheet (MSDS) for all materials to be removed.
9. If the Contractor introduces any chemical into the work environment, a MSDS for that chemical must be presented to the Owner's Representative prior to use.
10. Transporter must have notified the EPA and/or other appropriate local government agency in advance of its intentions to transport hazardous materials and, if applicable, receive an identification number. The transporter shall submit a copy of the NYS DEC Part 364 Permit, for review.
11. Health and Safety/Contingency Plan for material handling and emergency procedures.
12. Certification for medical examinations.
13. Respiratory protection program.
14. Project Plan: Provide a description of the methods, procedures and materials to be used in performing the work and handling all hazardous wastes. Also provide a schedule identifying specific work areas and duration. The schedules will be utilized to schedule facility and third party consultant requirements.
15. Waste Sampling Plan: Provide a sampling plan that describes all samples to be taken and the parameters to be analyzed, as well as the laboratory providing the services; or provide another basis for identification of the waste, such as an MSDS.

B. Do not start work until submittals are returned with the Owner’s Representative stamp indicating that the submittal is returned for unrestricted use.

1.04 REGULATORY REQUIREMENTS

A. All activities related to the work shall be conducted in compliance with all applicable laws, regulations, and requirements which may include, but not be limited to, the United States Environmental Protection Agency (US EPA), United States Department of Transportation (US DOT), Resource Conservation and Recovery Act (RCRA), Toxic Substances Control Act (TSCA), Occupational Safety and Health Administration (OSHA), New York State Department of Environmental Conservation (NYS DEC), and Local AHJ.

B. The Contractor is required to secure and maintain all required regulatory permits necessary to perform all aspects of the work.

C. The Contractor shall containerize and store waste in accordance with all applicable regulations. All containers are to be appropriately marked/labeled.

PART 2 PRODUCTS

2.01 MATERIALS

A. Drums: Recovery or salvage drums acceptable for disposal of hazardous waste. Prior approval of drums is required. Drums or containers must meet the required OSHA, EPA (40 CFR Parts 260-264 and 300), and DOT Regulations (49 CFR Parts 171-178). Use of damaged containers shall not be allowed.

B. Labels: As required by the EPA and OSHA for handling, transportation, and disposal of hazardous waste.

C. Absorbent Material: Clay, soil or any commercially available absorbent used for the purpose of absorbing hazardous or potentially hazardous materials.

PART 3 EXECUTION

3.01 EXECUTION

A. All waste shall be stored, handled, transported and disposed of in accordance with all federal, state and local guidelines and regulations. The Contractor is to obtain all permits, licenses, etc., which are necessary for the storing, transporting and disposing of hazardous waste. The

Contractor shall develop all applicable manifests, Profile Sheets, Land Ban Forms and any other documentation and co-ordinate with the Owner regarding proper signatures. The Contractor may be required to notify the EPA of the hazardous waste activities, and obtain an EPA identification number specifically for the project, if one is not available.

B. The Contractor shall identify and classify the hazardous waste generated through the performance of the work as per the governing regulations, and in accordance with the Waste Sampling Plan submittal from Section 1.1 above. The Contractor shall conduct the required sampling and chemical analysis for handling, storing, transporting and disposing of the hazardous waste.

C. The Contractor is responsible for securing appropriate treatment or disposal for the waste streams at a permitted TSDF, in compliance with all requirements, and for obtaining a copy of the waste manifest as executed by the TSDF. If the manifest is not returned within the required time, the contractor shall notify the Owner and the NYS DEC, and initiate an investigation as required.

D. Transporters shall maintain waste manifest and shipment record forms. All transporters are required to obtain and maintain NYS DEC Part 364 Waste Transporter permit and, if applicable, a NYC Fire Department permit for transporting flammables. The Part 364 Permit shall have the license plate number of the vehicle, the expiration date of the permit, the type of waste the hauler can take and the treatment, storage and disposal (TSD) facility to which the hauler can take the waste. The transporter must also have all applicable, current waste transportation permits for states where proposed disposal facility is located.

E. The Contractor shall supply all required placard and labeling, and shall have an appropriately trained individual to prepare and sign the hazardous waste manifest, as the DOT shipper.

F. The Contractor shall furnish all certified copies of manifests (interim storage and final disposal) within regulatory requirements. Within 30 days from the acceptance of the waste by the disposal facility, the Contractor shall provide the Owner with Certificate of Disposal documents, as a requirement for final payment.

G. Unless directed otherwise, the Contractor shall file the annual report and fee report if applicable for the hazardous waste shipped, and provide closure notification to EPA and DEC immediately upon completion of the work.

*HAZWOPER Training is not required if the waste is PCB Bulk waste alone, but OSHA HAZCOM and TSCA training are still required

END OF SECTION 028600

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Formwork, shoring, bracing and anchorage.

B. Concrete reinforcement and accessories.

C. Cast-in-place concrete, equipment pads.

D. Concrete curing and finishing.

E. Grout.

1.02 RELATED SECTIONS

A. Section 014500 - QUALITY CONTROL.

1.03 REFERENCES

A. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).

B. ACI 305R - Guide to Hot Weather Concreting; 2020.

C. ACI 308R - Guide to External Curing of Concrete; 2016.

D. ACI 318 - Building Code Requirements for Structural Concrete; 2019, with Errata (2021).

E. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.

G. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2019.

H. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2018.

I. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

J. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).

K. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.

L. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).

M. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2022.

N. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2018.

O. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting; 2015.

P. CRSI 63 - Recommended Practice for Placing Reinforcing Bars.

1.04 SUBMITTALS

A. Submit under provisions of Section 013300 - SUBMITTALS.

B. Shop Drawings: Indicate reinforcement sizes, spacings, and locations of reinforcing steel and wire fabric, bending and cutting schedules, splicing, and supporting and spacing devices. Indicate formwork dimensioning, materials, arrangement of joints and ties.

C. Design Data: Provide a concrete mix design for each type of concrete to be utilized on the project prior to commencement of work. The Contractor’s testing laboratory shall develop concrete mix designs and test all materials and mixes for conformance with these specifications. The costs associated with development of the design mix and testing of samples shall not be paid out stipulated cash allowance and shall be included in the bid price.

D. Furnish the Engineer’s field representative with transit-mix delivery slips.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Maintain one copy of document on site.

C. Concrete Testing Service: Engage a testing laboratory acceptable to the Architect/Engineer to perform material evaluation tests and to design concrete mixes under provisions of Section 014500 - QUALITY CONTROL.

D. For each mix proposed, make and cure four (4) standard 6 inch concrete test specimens in the lab in accordance with ASTM C192. Furnish compression test results made in accordance with ASTM C39/C39M. Break two (2) cylinders at seven (7) days and two (2) at twenty-eight (28) days.

1.06 QUALIFICATIONS

A. Prepare shop drawings under seal of professional structural engineer licensed in the state in which the project is located.

1.07 REGULATORY REQUIREMENTS

A. Conform to ACI 301 and all applicable codes for placement of concrete and related work.

1.08 COORDINATION

A. Coordinate work prior to commencement of work.

B. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors and other inserts.

C. Notify Engineer minimum 72 hours prior to commencement of concreting operations.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Plywood Forms: Douglas Fir species; solid one side grade; sound undamaged sheets. Thickness of wood shall be as required to support weight of concrete with minimal deflection.

B. Steel Forms: Minimum 16 gage (1.5 mm) thick, stiffened to support weight of concrete with minimum deflection.

C. Tubular Column Type Forms: Round, spirally wound laminated fiber material; inside surface treated with release agent.

D. Form Ties: Snap-off metal, of fixed length, cone ends.

E. Reinforcing: ASTM A615/A615M, 60 ksi (414 MPa) yield grade billet steel deformed bars; uncoated; size and dimensions as indicated on the plans.

F. Welded Steel Wire Fabric: Plain type, ANSI/ASTM A185; in flat sheets; size and dimensions as indicated on the plans.

G. Cement: ASTM C150, Type I - Normal.

H. Fine and Coarse Aggregates: ASTM C33.

I. Water: Clean and not detrimental to concrete.

2.02 ACCESSORIES

A. Air Entraining Admixture: ASTM C260.

B. Chemical Admixture: ASTM C494, Type as required.

C. Bonding Agent: Polymer resin emulsion manufactured by SPECCO INDUSTRIES, INC., or specifically approved equal.

D. Vapor Barrier: ASTM C1745, 6 mil (0.15 mm) thick clear polyethylene film.

E. Non-Shrink Grout: Premixed compound with non-metallic aggregate, cement, water reducing and plasticizing agents; capable of minimum compressive strength of 2400 psi (16.5 MPa) at 48 hours and 7000 psi (48.3 MPa) at 28 days.

F. Expansion Joints: ASTM C1063; 1/2 inch (13 mm) thick asphalt impregnated fiberboard or felt.

G. Form Release Agent: Colorless material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete; manufactured by SPECCO INDUSTRIES, INC. or specifically approved equal. Agent shall not be detrimental to the environment.

H. Sealant: ASTM D1190; hot applied rubber compound manufactured by THE BURKE COMPANY or specifically approved equal.

I. Absorptive Mat: Burlap-polyethylene, 8 oz/sq yd (270 g/sq m), bonded to prevent separation during use.

J. Membrane Curing Compound: ASTM C1315, Type 2, Class A.

K. Clear Sealer: Siloxane type; manufactured by THE BURKE COMPANY or specifically approved equal.

2.03 MIXES

A. Mix concrete in accordance with ASTM C94, Alternative No. 2, to achieve the following:
   1. Compressive Strength (28 day): 4,000 psi
   2. Slump:
      a. 3 +/-1 inches (initial/conventional mix)
      b. 7 +/-1 inches (final/pump mix)
   3. Air Entrainment: 5 ½ +/-1 percent
   4. Water/Cement Ration: 0.50 maximum
   5. Large Aggregate: ¾" crushed stone, ASTM C33, No. 67

B. Use admixtures only when approved by the Engineer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions prior to commencement of work.

B. Verify lines, levels, and measurement before proceeding with formwork. Ensure that dimensions agree with the plans.

3.02 PREPARATION

A. Hand trim sides and bottom of earth forms; remove loose dirt.

B. Align form joints.

C. Do not apply form release agent where concrete surfaces are to receive special finishes or applied coatings which may be affected by the agent.

D. Where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack with non-shrinking grout.

E. Prepare previously placed concrete by cleaning with steel brush and apply bonding agent in accordance with manufacturer's instructions.

3.03 INSTALLATION

A. Place, support, and secure reinforcement against displacement at the locations and to the dimensions as indicated on the plans.

B. Use reinforcing splices at a minimum of locations and only at locations of minimum stress. Review locations of splices with Engineer.

C. Splice overlap shall be a minimum length of 40 diameters.

D. Ensure reinforcement, inserts, embedded parts, formed joint fillers, joint devices and waterstops are not disturbed during concrete placement.

E. Install joint fillers in accordance with manufacturer's instructions.

F. Extend joint filler from bottom of slab to within 1/2 inch (13 mm) of finished slab surface.

G. Install joint devices in accordance with manufacturer's instructions.

H. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

I. Place concrete continuously between predetermined expansion, control and construction joints.

J. Do not interrupt successive placement; do not permit cold joints to occur.

3.04 INSTALLATION - SLABS

A. Place slabs in checkerboard pattern.

B. Saw cut control joints at an optimum time after finishing. Cut slabs with 3/16 inch (4.8 mm) thick blade, cutting 1/4 of depth of slab thickness.

C. Separate slabs on grade from vertical surfaces with joint filler. Extend joint filler from bottom of slab to within 1/4 inch (6 mm) of finished slab surface.

D. Steel trowel all surfaces except as noted.

E. Cure floor surfaces in accordance with ASTM C31.

F. Apply curing compound in accordance with manufacturer's instructions in 2 coats with second coat at right angles to the first.

3.05 TOLERANCES

A. Equipment Pads: Provide Class B tolerance to floor slabs according to ASTM E1155.

3.06 FIELD QUALITY CONTROL

A. Field inspection and testing of concrete will be performed under provisions of Section 014500 - QUALITY CONTROL.

B. Testing firm will take cylinders and perform slump and air entrainment tests in accordance with ASTM C31.

C. Four concrete test cylinders will be taken for every 50 cu yds, or fraction thereof, for each class of concrete placed each day.

D. One additional test cylinder will be taken during cold weather and be cured on site under same conditions as concrete it represents.

E. One slump test will be taken for each set of test cylinders taken.

3.07 PROTECTION

A. Protect finished work until completion of project.

B. Protect concrete from damage and deformation until project is accepted by the Owner.

3.08 SCHEDULE: CONCRETE FINISHES

A. Equipment Pads: Broom finish, trim edge.

B. All Other Finishes: Steel trowel surface, unless otherwise noted.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes maintenance of unit masonry consisting of brick clay masonry restoration and cleaning as follows:
   1. Unused anchor removal.
   2. Repairing unit masonry, including replacing units.
   3. Painting steel uncovered during the work.
   4. Re-anchoring veneers.
   5. Cleaning exposed unit masonry surfaces.

1.03 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Section 012200 - UNIT PRICES.
   1. Unit prices apply to authorized work covered by quantity allowances.

1.04 DEFINITIONS

A. Very Low-Pressure Spray: Under 100 psi (690 kPa).

B. Low-Pressure Spray: 100 to 400 psi (690 to 2750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

C. Medium-Pressure Spray: 400 to 800 psi (2750 to 5510 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

D. High-Pressure Spray: 800 to 1200 psi (5510 to 8250 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

E. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of masonry units to freezing and thawing.

1.05 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on masonry units as follows.
   1. Existing Brick: Test each type of existing masonry unit indicated for replacement, according to testing methods in ASTM C67/C67M for compressive strength, 24-hour cold-water absorption, 5-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove existing units from locations designated by Architect. Take testing samples from these units.
   2. Replacement Brick: Test each proposed type of replacement masonry unit, according to sampling and testing methods in ASTM C67/C67M for compressive strength, 24-hour cold-water absorption, 5-hour boil absorption, saturation coefficient, and initial rate of absorption (suction).

B. Mortar Analysis Test: The Contractor shall take two (2) (1/2 cup min.) samples of existing mortar from building joint areas approved by the Owner. Mortar shall be sent in closed protective containers to one of the laboratories listed herein and analyzed. Analysis shall consist of, but not be limited to, the following tests: Wet Chemical/Gravimetric Analysis & Examination, Chemical Dissolution, Aggregate Separation, and Sieve Mesh Analysis. All tests shall be completed in conformance with the latest applicable ASTM Standard(s). Test results shall include a detailed list of materials to make an exact replica of the existing mortar including strength, material composition, sources, color, and texture. Results shall include aggregate identification/source(s) and characteristics; binder to aggregate ratio and probable original mix based on lab analysis and historical investigations. Based upon the findings of the mortar analysis, the Contractor shall prepare two samples of the mortar for selection by the Architect and the Owner prior to the production of Mortar utilized for the project. Contractor shall have testing shall be preformed at one of the following testing labs:
   1. Jablonski Berkowitz Conservation Inc. (certified WBE)

40 W. 27th St., Suite 1201
NY, NY 10001
(212) 532-7775

2. ICR (Integrated Conservation Resources)
   32 Old Slip
   NY, NY 10005
   (212) 947-4499
3. BCA (Building Conservation Associates)
   44 E 32nd St.
   NY, NY 10016
   (212) 777-1300
4. Wiss, Janney, Elstner
   330 Pfingsten Road
   Northbrook, IL 60062-2095
   (847) 272-7740

1.06 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.

B. Samples for Verification: For the following:
   1. Each type of masonry unit to be used for replacing existing units. Include sets of Samples as necessary to show the full range of shape, color, and texture to be expected.
      a. For each brick type, provide straps or panels containing at least four bricks. Include multiple straps for brick with a wide range.
   2. Each type, color, and texture of pointing mortar in the form of sample mortar strips, 6 inches (150 mm) long by 1/4 inch (6 mm) wide by 1/2 inch (13 mm) high, set in aluminum or plastic channels.
      a. Include with each Sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments if any.

1.07 INFORMATIONAL SUBMITTALS

A. Qualification Data: For including field supervisors and restoration workers and testing service.

B. Restoration Program.

C. Cleaning Program.

1.08 QUALITY ASSURANCE

A. Restoration Specialist Qualifications: Engage an experienced, preapproved masonry restoration and cleaning firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience installing standard unit masonry is not sufficient experience for masonry restoration work.
   1. At Contractor's option, work may be divided between two specialist firms: one for cleaning work and one for repair work.
   2. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that clay masonry restoration and cleaning work is in progress. Supervisors shall not be changed during Project except for causes beyond the control of restoration specialist firm.
   3. Restoration Worker Qualifications: Persons who are experienced and specialize in restoration work of types they will be performing.
   4. Masonry cleaning and repair work shall conform to National Park Service Preservation Briefs #1 and #2.

B. Chemical-Cleaner Manufacturer Qualifications: A firm regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory-

trained representatives who are available for consultation and Project-site inspection and assistance at no additional cost.

C. Source Limitations: Obtain each type of material for masonry restoration (face brick, cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.

D. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage due to worker fatigue.

E. Restoration Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of restoration work including protection of surrounding materials and Project site.
   1. Include methods for keeping pointing mortar damp during curing period.
   2. If materials and methods other than those indicated are proposed for any phase of restoration work, add to the Quality-Control Program a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project and worker's ability to use such materials and methods properly.

F. Cleaning Program: Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used, protection of surrounding materials, and control of runoff during operations.
   1. If materials and methods other than those indicated are proposed for any phase of restoration work, add to the Quality-Control Program a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project and worker's ability to use such materials and methods properly.

G. Cleaning and Repair Appearance Standard: Cleaned and repaired surfaces are to have a uniform appearance as viewed from 20 feet (6 m) away by Architect. Perform additional paint and stain removal, general cleaning, and spot cleaning of small areas that are noticeably different, so that surface blends smoothly into surrounding areas.

H. Mockups: Prepare mockups of restoration and cleaning to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.
   1. Repointing: Rake out joints in 2 separate areas, each approximately 36 inches (900 mm) high by 48 inches (1200 mm) wide for each type of repointing required and repoint one of the areas.
   2. Cleaning: Clean an area approximately 25 sq. ft. (2.3 sq. m) for each type of masonry and surface condition.
      a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not use cleaners and methods known to have deleterious effect.
      b. Allow a waiting period of not less than seven days after completion of sample cleaning to permit a study of sample panels for negative reactions.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

I. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to masonry restoration and cleaning including, but not limited to, the following:
      a. Construction schedule. Verify availability of materials, Restoration Specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
      b. Materials, material application, sequencing, tolerances, and required clearances.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry units to Project site strapped together in suitable packs or pallets or in heavy-duty cartons.

B. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

E. Store lime putty covered with water in sealed containers.

F. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.10 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit masonry restoration and cleaning work to be performed according to manufacturers' written instructions and specified requirements.

B. Repair masonry units and repoint mortar joints only when air temperature is between 40 and 90 deg F (4 and 32 deg C) and is predicted to remain so for at least 7 days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for masonry repair and mortar-joint pointing unless otherwise indicated:
   1. When air temperature is below 40 deg F (4 deg C), heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F (4 and 49 deg C).
   2. When mean daily air temperature is below 40 deg F (4 deg C), provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within the enclosure for 7 days after repair and pointing.

D. Hot-Weather Requirements: Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F (32 deg C) and above unless otherwise indicated.

E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

F. Clean masonry surfaces only when air temperature is 40 deg F (4 deg C) and above and is predicted to remain so for at least 7 days after completion of cleaning.

1.11 COORDINATION

A. Coordinate masonry restoration and cleaning with public circulation patterns at Project site. Public circulation patterns cannot be closed off entirely, and in places can be only temporarily redirected around small areas of work. Plan and execute the Work accordingly.

1.12 SEQUENCING AND SCHEDULING

A. Order replacement materials at earliest possible date to avoid delaying completion of the Work.

B. Order sand and gray Portland cement for pointing mortar immediately after approval of mockups. Take delivery of and store at Project site a sufficient quantity to complete Project.

C. Perform masonry restoration work in the following sequence:
   1. Remove plant growth.
   2. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
   3. Remove paint.
   4. Clean masonry surfaces.
   5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.

6. Repair masonry, including replacing existing masonry with new masonry materials.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
10. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.

D. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units to comply with "Masonry Unit Patching" Article. Patch holes in mortar joints to comply with "Repointing Masonry" Article.

PART 2 - PRODUCTS

2.01 MASONRY MATERIALS

A. Face Brick: Provide face brick, including specially molded, ground, cut, or sawed shapes where required to complete masonry restoration work matching existing masonry.
   1. Provide units with colors, color variation within units, surface texture, size, and shape to match existing brickwork.
      a. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.
   2. Special Shapes:
      a. Provide specially molded, 100 percent solid shapes for applications where core holes or "frogs" could be exposed to view or weather when in final position and where shapes produced by sawing would result in sawed surfaces being exposed to view.
      b. Provide specially ground units, shaped to match patterns, for arches and where indicated.
      c. Mechanical chopping or breaking brick, or bonding pieces of brick together by adhesive, are not acceptable procedures for fabricating special shapes.
   3. Tolerances as Fabricated: Comply with tolerance requirements in ASTM C216, Type FBS or to match existing brick masonry tolerances.

B. Salvaged Brick: When available, obtain salvaged brick from Owner from location shown on Drawings. Clean off residual mortar prior to re-use.

C. Brick Staining: Custom blended hand applied emulsion to match existing brick masonry palette utilizing Nawkaw Emulsion Color Treatment NECT-90 as manufactured by NawKaw Corporation (1-905-542-7893) or Architect approved equivalent.

2.02 MORTAR MATERIALS

A. Portland Cement: {rs#1}, Type I or Type II, white or gray or both where required for color matching of exposed mortar.
   1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Mortar Sand: ASTM C144 unless otherwise indicated.
   1. Color: Provide natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
   2. For pointing mortar, provide sand with rounded edges.
   3. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.

D. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.

E. Mortar Staining: Nawkaw Corporation - NECT-90 Nawkaw emulsion color treatment or Architect approved equivalent.

F. Water: Potable.

2.03 MANUFACTURED REPAIR MATERIALS

A. Masonry Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching masonry.
   1. Products: Subject to compliance with requirements, provide the following:
      a. Cathedral Stone Products, Inc.; Jahn M100 Terra Cotta and Brick Repair Mortar.
      b. Architect approved equivalent.
   2. Use formulation that is vapor- and water permeable (equal to or more than the masonry unit), exhibits low shrinkage, has lower modulus of elasticity than the masonry units being repaired, and develops high bond strength to all types of masonry.
   3. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
   4. Formulate patching compound used for patching brick in colors and textures to match each masonry unit being patched. Provide sufficient number of colors to enable matching the color, texture, and variation of each unit.

2.04 CLEANING MATERIALS

A. Water: Potable.

B. Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium polyphosphate, 1/2 cup (125 mL) of laundry detergent, and 20 quarts (20 L) of hot water for every 5 gal. (20 L) of solution required.

C. Job-Mixed Mold, Mildew, and Algae Remover: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium polyphosphate, 5 quarts (5 L) of 5 percent sodium hypochlorite (bleach), and 15 quarts (15 L) of hot water for every 5 gal. (20 L) of solution required.

D. Non-acidic Gel Cleaner: Manufacturer's standard gel formulation, with pH between 6 and 9 that contains detergents with chelating agents and is specifically formulated for cleaning masonry surfaces.

E. Non-acidic Liquid Cleaner: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.
   1. Products: Subject to compliance with requirements, provide the following:
      a. PROSOCO; Enviro Klean 2010 All Surface Cleaner.
      b. Architect approved equivalent.

F. Masonry Prewash: Alkaline-based cleaning compound formulated to dissolve and assist in removal of heavy carbon encrustations from calcareous masonry such as Limestone and Sandstone. Use in conjunction with a Limestone Restorer to neutralize surfaces treated with Masonry Prewash.
   1. Prewash Product:
      a. PROSOCO 766 Limestone and Masonry Prewash.
      b. Architect approved equivalent.
   2. Neutralizer Product:
      a. PROSOCO Sure KLean Restoration Cleaner, Limestone & Masonry Afterwash.
      b. PROSOCO Limestone Restorer.
      c. Architect approved equivalent.

2.05 ACCESSORY MATERIALS

A. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.
   1. Products: Subject to compliance with requirements, provide the following:
      a. PROSOCO; Sure Klean Strippable Masking.
      b. Architect approved equivalent.

B. Masonry Repair Anchors, Spiral Type: Type 304 stainless-steel spiral rods designed to anchor to backing and veneer. Anchors are flexible in plane of veneer but rigid perpendicular to it.
   1. Provide driven-in anchors designed to be installed in drilled holes and relying on screw effect rather than adhesive to secure them to backup and veneer.
   2. Products: Subject to compliance with requirements, provide the following:
      a. Heckmann Building Products Inc.; Helix-Tie Spiral Remedial Tie #391.
      b. Hohmann & Barnard, Inc.; Torq-Lok Torque activated Restraining anchors.
      c. Hohmann & Barnard, Inc.; Helix Spiro-ties.
      d. Architect approved equivalent.

C. Sealant Materials:
   1. Provide manufacturer's standard chemically curing, elastomeric sealant(s) of base polymer and characteristics indicated below that comply with applicable requirements in Section 079200 - JOINT SEALANTS.
      a. Single-component, non-sag urethane sealant.
   2. Colors: Provide colors of exposed sealants to match colors of masonry adjoining installed sealant unless otherwise indicated.

D. Joint-Sealant Backing:
   1. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
   2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where acceptable.

E. Setting Buttons: Resilient plastic buttons, nonstaining to masonry, sized to suit joint thicknesses and bed depths of masonry units without intruding into required depths of pointing materials.

F. Masking Tape: Nonstaining, nonabsorbent material, compatible with pointing mortar, joint primers, sealants, and surfaces adjacent to joints; that will easily come off entirely, including adhesive.

G. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.
   1. Use coating requiring no better than SSPC-SP 3, "Power Tool Cleaning" surface preparation according to manufacturer's literature or certified statement.
   2. Use coating 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).

H. Surface Applied Silane/Siloxane Water-repellent Sealers: Breathable, water-based, silane / siloxane blended water-repellant shall be provided for waterproofing purposes should the integral means specified herein not produce the level of waterproofing required. Material for waterproofing Concrete Masonry Units shall be MasterProtect H 185 as manufactured by Master Builders (MBCC/Sika AG) or approved equal. Material for Brick Masonry units shall be MasterProtect H 177 as manufactured by Master Builders (MBCC/Sika AG) or Architect approved equivalent.

I. Miscellaneous Products: Select materials and methods of use based on the following, subject to approval of a mockup:
   1. Previous effectiveness in performing the work involved.
   2. Little possibility of damaging exposed surfaces.
   3. Consistency of each application.
   4. Uniformity of the resulting overall appearance.
   5. Do not use products or tools that could do the following:
      a. Remove, alter, or in any way harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in contract.
      b. Leave a residue on surfaces.

2.06 MORTAR MIXES

A. Preparing Lime Putty: Slake quicklime and prepare lime putty according to appendix to ASTM C5 and manufacturer's written instructions.

B. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
   1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not re-temper or use partially hardened material.

C. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
   1. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.

D. Do not use admixtures in mortar unless otherwise indicated.

E. Mortar Proportions: Mix mortar materials in the following proportions:
   1. Pointing Mortar for Brick: 1 part Portland cement, 2 parts lime, and 6 parts sand.
      a. Add mortar pigments to produce mortar colors required.
   2. Rebuilding (Setting) Mortar: Comply with ASTM C270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to Portland cement and lime.

2.07 CHEMICAL CLEANING SOLUTIONS

A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.

B. Acidic Cleaner Solution for Brick: Dilute with water to produce hydrofluoric acid content of 3 percent or less, but not greater than that recommended by chemical-cleaner manufacturer.

PART 3 - EXECUTION

3.01 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.
   1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.

B. Comply with chemical-cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical-cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
   1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
   2. Keep wall wet below area being cleaned to prevent streaking from runoff.
   3. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
   4. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
   5. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

C. Prevent mortar from staining face of surrounding masonry and other surfaces.
   1. Cover sills, ledges, and projections to protect from mortar droppings.
   2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
   3. Immediately remove mortar in contact with exposed masonry and other surfaces.
   4. Clean mortar splatters from scaffolding at end of each day.

3.02 UNUSED ANCHOR REMOVAL

A. Remove masonry anchors, brackets, wood nailers, and other extraneous items no longer in use unless identified as historically significant or indicated to remain.
   1. Remove items carefully to avoid spalling or cracking masonry.
   2. Where directed, if an item cannot be removed without damaging surrounding masonry, do the following:
      a. Cut or grind off item approximately 3/4 inch (20 mm) beneath surface and core drill a recess of same depth in surrounding masonry as close around item as practical.
      b. Immediately paint exposed end of item with two coats of anti-rust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.
   3. Patch the hole where each item was removed unless directed to remove and replace the masonry unit.

3.03 BRICK REMOVAL AND REPLACEMENT

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
   1. When removing single bricks, remove material from center of brick and work toward outside edges.

B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

D. Remove in an undamaged condition as many whole bricks as possible.
   1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
   2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
   3. Store brick for reuse. Store off ground, on skids, and protected from weather.
   4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.

E. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.

F. Replace removed damaged brick with other removed brick in good quality, where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to usable size.

G. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
   1. Maintain joint width for replacement units to match existing joints.
   2. Use setting buttons or shims to set units accurately spaced with uniform joints.

H. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67/C67M initial rates of absorption (suction) of more than 30 gr/30 sq. in. per min. (30 g/194 sq. cm. per min.). Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
   1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.

2. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry, and at same time as repointing of surrounding area.
3. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

3.04 REANCHORING VENEERS

A. Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions. Install at not more than 16 inches (406.4 mm) o.c. vertically and 32 inches (812.8 mm) o.c. horizontally unless otherwise indicated. Install at locations to avoid penetrating flashing.

B. Recess anchors at least 5/8 inch (15.88 mm) from surface of mortar joint and fill recess with pointing mortar.

3.05 PAINTING STEEL UNCOVERED DURING THE WORK

A. Inspect steel exposed during masonry removal. Where the Architect determines that it is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:
   1. Remove paint, rust, and other contaminants according to SSPC-SP 3, "Power Tool Cleaning", as applicable to meet paint manufacturer's recommended preparation.
   2. Immediately paint exposed steel with two coats of anti-rust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).

B. If on inspection and rust removal, the cross section of a steel member is found to be reduced from rust by more than 1/16 inch (1.58 mm), notify Architect before proceeding.

3.06 MASONRY UNIT PATCHING

A. Patch the following masonry units unless another type of replacement or repair is indicated:

B. Remove and replace existing patches unless otherwise indicated or approved by Architect.

C. Patching Bricks:
   1. Remove loose material from masonry surface. Carefully remove additional material so patch will not have feathered edges but will have square or slightly undercut edges on area to be patched and will be at least 1/4 inch (6 mm) thick, but not less than recommended by patching compound manufacturer.
   2. Mask adjacent mortar joint or rake out for repointing if patch will extend to edge of masonry unit.
   3. Mix patching compound in individual batches to match each unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
   4. Rinse surface to be patched and leave damp, but without standing water.
   5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
   6. Place patching compound in layers as recommended by patching compound manufacturer, but not less than 1/4 inch (6 mm) or more than 2 inches (50.8 mm) thick. Roughen surface of each layer to provide a key for next layer.
   7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the masonry unit. Shape and finish surface before or after curing, as determined by testing, to best match existing masonry unit.
   8. Keep each layer damp for 72 hours or until patching compound has set.

3.07 CLEANING MASONRY, GENERAL

A. Proceed with cleaning in an orderly manner; work from bottom to top of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water will not wash over cleaned, dry surfaces.

B. Use only those cleaning methods indicated for each masonry material and location.

1. Do not use wire brushes or brushes that are not resistant to chemical cleaner being utilized. Do not use plastic-bristle brushes if natural-fiber brushes will resist chemical cleaner being used.
2. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage masonry.
   a. Equip units with pressure gauges.
3. For chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray tip.
4. For water-spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
5. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F (60 and 71 deg C) at flow rates indicated.

C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.

D. Water Application Methods:
1. Water-Soak Application: Soak masonry surfaces by applying water continuously and uniformly to limited area for time indicated. Apply water at low pressures and low volumes in multiple fine sprays using perforated hoses or multiple spray nozzles. Erect a protective enclosure constructed of polyethylene sheeting to cover area being sprayed.
2. Water-Spray Applications: Unless otherwise indicated, hold spray nozzle at least 6 inches (152.4 mm) from surface of masonry and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.

E. Chemical-Cleaner Application Methods: Perform a test panel (4 foot high by 4 foot long) to ensure surfaces will not be harmed or stained by application of undiluted material. Apply chemical cleaners to masonry surfaces to comply with chemical-cleaner manufacturer's written instructions; use brush or spray application. Do not spray apply at pressures exceeding 50 psi (345 kPa). Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.

F. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed.
1. Apply neutralizing agent and repeat rinse if necessary to produce tested pH of between 6.7 and 7.5.

G. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.08 CLEANING BRICKWORK

A. Cold-Water Soak:
1. Apply cold water by intermittent spraying to keep surface moist.
2. Use perforated hoses or other means that will apply a fine water mist to entire surface being cleaned.
3. Apply water in cycles with at least 30 minutes between cycles.
4. Continue spraying until surface encrustation has softened sufficiently to permit its removal by water wash, as indicated by cleaning tests.
5. Continue spraying for 72 hours.
6. Remove soil and softened surface encrustation from masonry with cold water applied by low-pressure spray.

B. Cold-Water Wash: Use cold water applied by low-pressure spray.

C. Detergent Cleaning:
1. Wet masonry with cold water applied by low-pressure spray.

2. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that masonry surface remains wet.
3. Rinse with cold water applied by low -pressure spray to remove detergent solution and soil.
4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

D. Mold, Mildew, and Algae Removal:
1. Wet masonry with hot water applied by low-pressure spray.
2. Apply mold, mildew, and algae remover by brush or low-pressure spray.
3. Scrub masonry with medium-soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that masonry surface remains wet.
4. Rinse with cold water applied by medium -pressure spray to remove mold, mildew, and algae remover and soil.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

E. Nonacidic Gel Chemical Cleaning:
1. Apply non-acidic gel cleaner in 1/8-inch (3-mm) thickness by brush, working into joints and crevices. Apply quickly and do not brush out excessively so area will be uniformly covered with fresh cleaner and dwell time will be uniform throughout area being cleaned.

3.09 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.
1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

C. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

D. Restoration cleaning:
1. All protective strippable masking, polyethylene sheeting and tape shall be removed.
2. Window glass or painted or unpainted metal that shows evidence of contamination from chemicals shall be thoroughly washed with clear water.
3. All debris form this operation shall be removed from the job site, upon completion.

END OF SECTION

FLASPART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contra ct, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes
   1. Face brick.
   2. Fireclay brick.
   3. Mortar and grout.
   4. Reinforcement.
   5. Ties and anchors.
   6. Thermal Brick Support System.
   7. Miscellaneous masonry accessories.
   8. Water Repellant.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:
   1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.

C. Samples for Initial Selection:
   1. Face brick, in the form of straps of five or more bricks.
   2. Colored mortar.

D. Samples for Verification: For each type and color of the following:
   1. Face brick, in the form of straps of five or more bricks.
   2. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.

1.04 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of the following:
   1. Masonry units.
   2. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.
   3. Anchors, ties, and metal accessories.

B. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.05 QUALITY ASSURANCE

A. 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, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
   1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.
   2. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
   3. ASTM A193/A193M - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications; 2025.

4. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2022a.
5. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2018.
6. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025.
7. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
8. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2022.
1. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021a.
2. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.
3. ASTM C27 - Standard Classification of Fireclay and High-Alumina Refractory Brick; 1998 (Reapproved 2022).
4. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2017.
5. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2024.
6. 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; 2022.
7. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2024.
8. ASTM C1261 - Standard Specification for Firebox Brick for Residential Fireplaces; 2013, with Editorial Revision (2017).
9. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber; 2020.
10. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockup of typical wall area as shown on Drawings.
   2. Build mockups for each type of exposed unit masonry construction in sizes approximately 60 inches long by 48 inches high by full thickness, including accessories.
      a. Include a sealant-filled joint at least 16 inches long in mockup.
      b. Include through-wall flashing installed for a 24 inch (600-mm) length in corner of exterior wall 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).
      c. Include metal studs, sheathing, building wrap, veneer anchors, flashing, cavity drainage material, and weep holes in mockup.
   3. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
   4. Protect accepted mockups from the elements with weather-resistant membrane.
   5. 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 does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.

1.06 DELIVERY, STORAGE, AND HANDLING

A. 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.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.07 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 of walls and hold cover securely in place.

B. 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 spreading coverings 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.

C. 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 402/602.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 402/602.

PART 2 - PRODUCTS

2.01 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.02 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units.
   1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
   2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
   3. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick: Facing brick complying with ASTM C216.
   1. Products: Subject to compliance with requirements, provide the following:
      a. Standard Modular size brick unless indicated otherwise. Texture, Type, Color, and Finish shall be selected by Architect from a manufacturer's standard brick selection <>.
      b. Architect approved equivalent.

2. Grade: SW.
3. Type: FBS
4. Initial Rate of Absorption: Less than 30g/30 sq. in. (30g/194 sq. cm) per minute when tested per ASTM C67.
5. Efflorescence: Provide brick that has been tested according to ASTM C67 and is rated "not effloresced."

2.03 REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A951/A951M.

B. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187 inch (4.75 mm) diameter, hot-dip galvanized, carbon-steel continuous wire.

2.04 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
   1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/ 82M; with ASTM A153/A153M, Class B-2 coating.
   2. Stainless-Steel Wire: ASTM A580/A580M, Type 304.
   3. Steel Sheet, Galvanized after Fabrication: ASTM A653/A653M, Commercial Steel, Class B coating.
   4. Stainless-Steel Sheet: ASTM A240/A240M, Type 304.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
   1. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25.4 mm) of masonry face, made from 0.187-inch diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.

D. Adjustable Masonry-Veneer Anchors:
   1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs, and as follows:
      a. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
   2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.
      a. Products: Subject to compliance with requirements, provide one of the following:
         1) Heckmann Building Products Inc.; 315-D.
         2) Hohmann & Barnard, Inc.; DW-10HS.
   3. Thermal 2-Seal Wing Nut Anchor for Metal Stud Construction: 2-Seal reinforced flame-resistant plastic Wing Nut Anchor with 1 1/2 inch diameter Type 304 Stainless Steel / bonded EPDM washer to seal against insulation and secure insulation to backup. Additional washer on Anchor barrel seals against the Air/Vapor Barrier. Length of each Anchor shall be as required by the detailed sheathing and insulation depths. Each anchor shall be provided with a Hot-Dip Galvanized, 3/16 inch diameter Compressed Leg 2X-HOOK with offsets as required to provide a minimum of 2 inch engagement of the masonry veneer. Space 16 inches on center in each direction maximum or less if indicated on the drawings.
      a. Manufacturer:
         1) Hohmann & Barnard, Inc.
         2) Architect approved equivalent.
      b. For Seismic requirements, provide 3/16 inch diameter continuous Hot-Dip Galvanized wire in conjunction with the 2X-HOOK Seismic Pintle.

4. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 (4.83-mm) diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours.

2.05 THERMAL BRICK SUPPORT SYSTEM

A. Thermal Brick Support System with components fabricated from hot-dip galvanized steel as manufactured by Hohmann & Barnard or Architect approved equal. Type: TBS-B (Bracket Style) and TBS-F (Fin Style) as indicated on the drawings.
   1. Bracket Depth: As indicated on the drawings.
   2. Bracket Length: As indicated on the drawings.
   3. Projecting Leg Depth: As indicated on the drawings.

B. Fasteners:
   1. Provide fasteners of type, grade, and class required to produce connections suitable for anchoring brick support system to other types of construction indicated and capable of withstanding design loads.
   2. Fastener Materials: Fabricate fasteners and anchors from stainless steel, ASTM A193/A193M, Type 304 stainless steel; temper as required to support loads imposed without exceeding allowable design stresses.

C. Finishes:
   1. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A123/A123M for steel hardware and with ASTM A653/A653M for other steel products.

2.06 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
   1. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with ribs at 3 inch (76 mm) intervals along length of flashing to provide an integral mortar bond.

B. Flexible Flashing: Use the following unless otherwise indicated:
   1. Thermoplastic (TPO) Flashing: Composite flashing product consisting of an open-weave polyester-reinforced ethylene interpolymer alloy and weep tabs.
      a. Products: Subject to compliance with requirements, provide the following:
         1) Mortar Net USA, Ltd.; Total Flash.
         2) Architect approved equivalent.
      b. Monolithic Sheet: TPO Elastomeric thermoplastic flashing, 0.040 inch (1.0 mm) thick with integral 3 inch wide, 26 gauge Stainless Steel with 3/8 inch hemmed edge drip edge, polyester drainage matrix, 1 1/4 inch high,16 gauge Stainless Steel with 1/2" lip. termination bar with self -sealing, self-tapping #14 x 2 inch stainless steel fasteners at 6" o.c., integral weeps. Provide 14 inch high pre-molded inside and outside corner boots and universal right and left end high performance membrane end dams.
      c. Accessories: Provide preformed corners, end dams, other special shapes, and butyl seaming materials produced by flashing manufacturer.

C. Application: Unless otherwise indicated, use the following:
   1. Where flashing is indicated to receive counterflashing, use metal flashing.
   2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
   3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge.
   4. Where flashing is fully concealed, use flexible flashing.

2.07 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Pre-molded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
   b. Mortar Net USA, Ltd.; Mortar Net.
   c. CavClear Masonry Mat; MasonPro, Inc.
2. Provide one of the following:
   a. Cavity Wall Drainage System: Total Flash System as manufactured by Mortar Net USA, Ltd. System is an all-inclusive flashing/drainage system with adhered cavity drainage/mortar collection material, drip edge, termination bar, weep tabs with included fasteners and adhesives. This system replaces the separate requirements for flashing, weeps, mortar collection products, drip edge and termination bar.
   b. Architect approved equivalent system.

2.08 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: 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. 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. EaCo Chem, Inc.
      b. ProSoCo, Inc.
      c. Architect approved equivalent.

2.09 MORTAR MIXES

A. General: Do not use admixtures, including 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.
   2. Use Portland cement-lime mortar unless otherwise indicated.
   3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Pre-blended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a pre-blended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. 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 masonry cement by weight.
   3. Mix to match Architect's sample.
   4. Application: Use pigmented mortar for exposed mortar joints with the following units:
      a. Face brick.

D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
   1. Application: Use colored aggregate mortar for exposed mortar joints with the following units:
      a. Face brick.

2.10 WATER REPELLANT

A. Water Repellent: Chemical treatment application to reduce water infiltration in natural stone, stucco, concrete, brick and other masonry substrates. R97 water repellent, environmentally safe, 50 state VOC compliant, free of flammable solvents and fumes, caustics and MUST NOT contain Silanes, Siloxanes or derivatives of Silanes and or Siloxanes. Products must be compatible with all porous masonry substrates including repair and replacement materials. Cathedral Stone Products; contact Technical Representative at Tel: 410-782-9150; fax: 410-782-9155 or Architect approved equivalent.

1. Water repellent must not contain or produce any VOC's
2. Minimum rating of 80 perms when applied to manufactures specification.
3. Water Repellant must not lower the water vapor transmission (WVT) of the substrate by more than 1/3 of its pretreated value.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
   1. Mix units from several pallets or cubes as they are placed.

D. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C67. Allow units to absorb water so they are damp but not wet at time of laying.

3.03 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
   2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
   3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet , 1/4 inch in 20 feet, or 1/2 inch maximum.
   3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
   5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch (12 mm) maximum.
   6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m) or 1/2 inch (12 mm) maximum.
   7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch , with a maximum thickness limited to 1/2 inch; do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).
3. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.04 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less than nominal 4 inch (100 mm) horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.05 MORTAR BEDDING AND JOINTING

A. Lay hollow brick as follows:
1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings or foundation walls.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.06 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
1. Provide an open space not less than 1/2 inch (13 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally.

3.07 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
1. Fasten anchors with metal fasteners of type indicate as specified by manufacturers. Use two fasteners unless anchor design only uses one fastener.
2. Embed tie sections in masonry joints. Provide not less than 2 inches (50 mm) of air space between back of masonry veneer and face of sheathing.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.

4. Maximum vertical offset of bed joints from one wythe to the other shall be 1 1/4 inch when utilizing adjustable wall ties such as pintle ties.
5. Pintle ties shall have two legs of W2.8 wire size minimum.
6. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches (407 mm) o.c. horizontally, with not less than 1 anchor for each 1.77 sq. ft. of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 8 inches (203 mm), around perimeter.

3.08 LINTELS

A. Install galvanized steel lintels where indicated on drawings.

B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.09 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the "International Building Code."
   1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

3.10 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste; including excess or soil-contaminated sand, waste mortar, and broken masonry units and masonry cut-offs by crushing and mixing with fill material as fill is placed.
   1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
   2. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

C. Legally dispose of off-site, any excess masonry waste.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Concrete masonry units.
   2. Mortar and grout.
   3. Cleaning of masonry.

1.03 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

1.04 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
   1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 402/602.
   2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

B. Fire Rated Assemblies: Tested in accordance with ANSI/UL 263 "Fire Tests of Building Construction and Materials" conforming to UL Assembly No. U906 .

1.05 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
   1. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C140/C140M for compressive strength.
   2. Mortar Test (Property Specification): For each mix required, according to ASTM C109/C109M for compressive strength, ASTM C 1506 for water retention, and ASTM C91/C91M for air content.
   3. Mortar Test (Property Specification): For each mix required, according to ASTM C780 for compressive strength.
   4. Grout Test (Compressive Strength): For each mix required, according to ASTM C1019.
   5. Prism Test: For each type of construction required, according to ASTM C1314.

1.06 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:
   1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.

C. Samples for Initial Selection:
   1. Colored mortar.

D. Samples for Verification: For each type and color of the following:
   1. Exposed CMUs.
   2. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.
   3. Accessories embedded in masonry.

1.07 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers,

source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:
   1. Masonry units.
      a. Include data on material properties material test reports substantiating compliance with requirements.
      b. For masonry units, include data and calculations establishing average net-area compressive strength of units.
   2. Cementitious materials. Include brand, type, and name of manufacturer.
   3. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.
   4. Grout mixes. Include description of type and proportions of ingredients.
   5. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.
   1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
   2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 402/602.

F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.08 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.

B. In accordance with the Statement of Special Inspections, the Special Inspector shall provide, and coordinate inspections and verifications as noted on Contract Drawings.

C. Special Testing Inspections: Owner shall employ a Special Inspection Agency to provide required inspections in accordance with current Building Code of New York State.

D. The Special Inspector shall submit copies of reports to Architect, Engineer, Owner's Site Representative and Contractor on day that tests are made. Include date of testing, weather conditions, building location and test location.

E. 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, from single source from single manufacturer for each product required.

F. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

G. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 402/602 unless modified by requirements in the Contract Documents.
   1. ASTM C90 - Standard Specification for Dry-Cast Loadbearing Concrete Masonry Units; 2024a.
   1. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2025a.
   2. ASTM C476 - Standard Specification for Grout for Masonry; 2020.

3. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2020.
4. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.
5. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2020.
6. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).

H. Mock-up Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014500 - QUALITY CONTROL for mockups.
1. Build sample panels for typical exterior wall in sizes approximately 72 inches long by 48 inches high by full thickness.
2. Where masonry is to match existing, erect panels adjacent and parallel to existing surface.
3. Protect approved sample panels from the elements with weather-resistant membrane.
4. Approval of sample mock-up panel is for the following items:
   a. Color, texture, and blending of masonry units;
   b. Relationship of mortar and sealant colors to masonry unit colors;
   c. Tooling of joints;
   d. Aesthetic qualities of workmanship;
   e. Other material and construction qualities specifically requested by Architect in writing.
5. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.

1.09 DELIVERY, STORAGE, AND HANDLING

A. 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.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.10 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 of walls and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three 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 spreading coverings 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.

D. 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 402/602.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 402/602.

PART 2 - PRODUCTS

2.01 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.02 CONCRETE MASONRY UNITS

A. Regional Materials: CMUs shall be manufactured within 500 miles of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the Project site.

B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide bullnose units for outside corners unless otherwise indicated.

C. Integral Water Repellent: Provide units made with integral water repellent for exposed units and where indicated.
1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E514/E514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
a. Products : Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1) ACM Chemistries, Inc.; RainBloc.
2) BASF Group; MasterPel 240
3) Grace Construction Products, W. R. Grace & Co.; Dry-Block.

D. CMUs: ASTM C90.
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi(19.3 MPa).
2. Density Classification: Normal weight.
3. Size: Manufactured to dimensions 3/8 inch less than nominal dimensions. Provide in sizes indicated on the drawings.
4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample or as indicated on the drawings.

5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.03 MORTAR AND GROUT MATERIALS

A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

B. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

C. Hydrated Lime: ASTM C207, Type S.

D. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing no other ingredients.

E. Masonry Cement: ASTM C91/C91M.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Essroc, Italcementi Group; Brixment or Velvet.
      b. Holcim (US) Inc; Mortamix Masonry Cement.
      c. Lafarge North America Inc.; Magnolia Masonry Cement.
      d. Lehigh Cement Company; Lehigh Masonry Cement.

F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Davis Colors; True Tone Mortar Colors.
      b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
      c. Solomon Colors, Inc.; SGS Mortar Colors.

G. Colored Cement Product: Packaged blend made from Portland cement and hydrated lime or mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

H. Aggregate for Mortar: ASTM C144.
   1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
   2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
   3. White-Mortar Aggregates: Natural white sand or crushed white stone.
   4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

I. Grout: ASTM C476. 2,000 psi minimum
   1. Fine aggregate: sand.
   2. Coarse aggregate: 3/8" chip gravel

J. Aggregate for Grout: ASTM C404.

K. Cold-Weather Admixture: Non-chloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Euclid Chemical Company (The); Accelguard 80.
      b. Grace Construction Products, W. R. Grace & Co.; Morset.
      c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.

L. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs, containing integral water repellent by same manufacturer.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. ACM Chemistries, Inc.; RainBloc for Mortar.
   b. BASF Aktiengesellschaft; MasterPel 240MA Mortar Admixture.
   c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.

M. Water: Potable.

2.04 REINFORCEMENT

2.05 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

B. Dovetail Slots in Concrete: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from 0.034-inch, galvanized steel sheet.

C. Anchor Bolts: L-shaped steel bolts complying with ASTM A307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A153/A153M, Class C; of dimensions indicated.

D. Post-installed Anchors: chemical anchors.
   1. Load Capacity: Capable of sustaining, 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 E488/E488M, conducted by a qualified independent testing agency.
   2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5 unless otherwise indicated.
   3. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 A1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

2.06 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Pre-molded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

D. Single Wythe Cavity Weep units: Provide continuously in base joint of single wythe masonry installations. Units shall be Cavity Weep CV 5010 as manufactured by MTI or Architect approved equivalent.

E. Grout Stop: Provide Hohmann & Barnard, Inc. - HGS Mortar / Grout Screen or approved equal; ASTM D5034, non-corrosive, high strength 1/4 inch mesh polypropylene monofilament screening in widths conforming to CMU units. Cut away as required to allow grout flow at reinforced core locations.

2.07 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including 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. Use Portland cement-lime masonry cement mortar unless otherwise indicated.
   3. For exterior masonry, use Portland cement-lime masonry cement mortar.
   4. For reinforced masonry, use Portland cement-lime masonry cement mortar.
   5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Pre-blended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a pre-blended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
   1. For masonry below grade or in contact with earth, use Type M.
   2. For reinforced masonry, use Type S.
   3. For mortar parge coats, use Type N.
   4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
   5. For interior non-load-bearing partitions, Type O may be used instead of Type N.

D. 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. Mix to match Architect's sample.
   3. Application: Use pigmented mortar for exposed mortar joints with the following units:
      a. Architectural CMUs.
      b. Cast stone trim units.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
   1. Mix to match Architect's sample.
   2. Application: Use colored aggregate mortar for exposed mortar joints with the following units:
      a. Architectural CMUs.
      b. Cast stone trim units.

F. Grout for Unit Masonry: Comply with ASTM C476.
   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 402/602 for dimensions of grout spaces and pour height.
   2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi(14 MPa).
   3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143/C143M.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped

edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.03 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch .
   2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
   3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
   3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet or 1/2 inch maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
   5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
   6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

C. Joints:
   1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch with a maximum thickness limited to 1/2 inch.
   2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
   3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
   4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. 3 mm.

3.04 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Lay exposed masonry in running bond unless indicated otherwise on the Contract Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. 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.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

H. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
   1. Install compressible filler in joint between top of partition and underside of structure above.
   2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
   3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
   4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section {\id\#1000276} - {\t\#1000276}.

3.05 MORTAR BEDDING AND JOINTING

A. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

B. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
   1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
   2. Allow cleaned surfaces to dry before setting.
   3. Wet joint surfaces thoroughly before applying mortar.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.06 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
   1. Provide an open space not less than 2 inches wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.07 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 402/602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 402/602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.08 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the Building Code of New York State.
1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140/C140M for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

I. Prism Test: For each type of construction provided, according to ASTM C1314 at 28 days.

3.09 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.10 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

C. 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 cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.

5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.11 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
   1. Crush masonry waste to less than 4 inches in each dimension.
   2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section {\id\#1000893} - {\t\#1000893}.
   3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Roof deck and accessories.
   2. Formed steel cant strips.
   3. Bearing plates and angles
   4. Framing for openings up to and including 18 inches.
   5. Closure panels for cell voids.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated provide deck profile characteristics and dimension, structural properties and finish.
   1. Include a statement indicating costs for each product having recycled content.

B. Shop Drawings:
   1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction. Indicate temporary shoring of decking where required. Indicate welded connections using standard AWS A2.0 welding symbols and indicate net weld lengths.

1.04 INFORMATIONAL SUBMITTALS

A. Submit under the provisions of Section 013300 - SUBMITTALS.

B. Welding certificates.

C. Product Certificates: For each type of steel deck by product manufacturer.

D. Manufacturer's instructions: indicate special installation sequence and special instructions required for proper installation.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
   1. Power-actuated mechanical fasteners.

F. Research/Evaluation Reports: For steel deck.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

B. Installer: Company specializing in performing the work of this section with a minimum of three (3) years of documented experience.

C. Design deck layout, spans, fastening and joints under the supervision of a Professional Structural Engineer experienced in the design of this work and licensed in the State in which the project is located.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

E. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

F. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

G. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

H. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

1.06 PERFORMANCE REQUIREMENTS

A. Metal decking design shall be in accordance with SDI Design Manual for Composite Decks, Form Decks, and Roof Decks. Substitutions shall be designed to meet or exceed published section properties of the specified materials. Section properties shall be computed in accordance with American Iron and Steel Institute Specification for the Design of Cold Formed Steel Structural Members.

B. Lateral deflection of diaphragm shall not exceed 1/500 of the story height. Maximum vertical deflection shall not exceed L/240 of the span length.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Cut plastic wrap to encourage ventilation.

C. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

D. Do not handle products in a manner which will distort or damage materials.

E. Do not store decking directly on the ground.

F. Store materials in a manner which will permit ease of access for inspection and identification.

G. Schedule delivery of the materials to the site at intervals which will ensure uninterrupted progress of the work.
   1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

1.08 FIELD MEASUREMENTS

A. Verify that field measurements are as shown on the contract drawings and approved shop drawings as required by the manufacturer.

B. The contractor is responsible for the proper locations and elevations of the work of this section.

1.09 COORDINATION

A. Coordinate the work under provisions of Section 013100 - PROJECT MANAGEMENT AND COORDINATION.

B. Coordinate the work of this section with utility installations and all other adjacent work.

C. Coordinate the work such that the general progress of the work is not interrupted.

1.10 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Metal decking design shall be in accordance with SDI Design Manual for Composite Decks, Form Decks, and Roof Decks. Substitutions shall be designed to meet or exceed published section properties of the specified materials. Section properties shall be computed in accordance with the American Iron and Steel Institute Specification for the Design of Cold Formed Steel Structural Members

C. Lateral deflection of diaphragm shall not exceed 1/500th of the story height. Maximum vertical deflection shall not exceed L/240th of the span length.

D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

E. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

PART 2 - PRODUCTS

2.01 METAL ROOF DECK

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Nucor Corp.; Vulcraft Division.
   2. Canam.
   3. New Millennium Building Systems.
   4. Substitutions shall be permitted only after receiving approval from the Architect/Engineer.

B. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
   1. Galvanized and Shop-Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Minimum 33 Ksi yield strength, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
      a. Color: Manufacturer's standard.
   2. Deck Profile: Type B or as indicated on the drawings.
   3. Profile Depth: 1-1/2 inches (38 mm) or as indicated on the drawings.
   4. Design Uncoated-Steel Thickness: 20 gauge unless otherwise indicated.
   5. Span Condition: Simple span.
   6. Side Laps: Overlapped.

2.02 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Welded Materials: AWS D1.1/D1.1M.

C. Primer: Flexible, Rust inhibitive.

D. Touch-up Primer: Red Oxide Type.

E. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

F. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

G. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber. one inch thick profile to fit tight to decking in compression.

H. Shear Connectors: 3/4 inch diameter, 4 1/2" inch long welded headed studs. locate as indicated on the contract drawings.

I. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material, gauge and finish as deck; of profile indicated or required for application.

J. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.

K. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

L. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.

M. Recessed Sump Pans: Single-piece steel sheet, 14 gauge or 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch (76-mm) wide flanges and sloped recessed side pans of 1-1/2inch (38-mm) minimum depth below deck surface. For drains, cut holes in the field.

N. Galvanizing Repair Paint: ASTM A780/A780M.

O. Bearing Plates and Angles: ASTM A36/A36M steel, unfinished.

P. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

Q. Closure Panels: Neoprene Blend-FR as manufactured by Carrington Specialty Products, Inc., or approved equal.
   1. Fire-rated Neoprene-blend formed to match profile of deck at each location.
   2. Install compatible backer rod and sealant to seal all edge conditions airtight.
   3. Physical Characteristics:
      a. Nominal Density: 5 to 7 pcf.
      b. Tensile Strength: 50 psi.
      c. Elongation: 150% to break.
      d. Compression Set: 50% of original thickness.
      e. Compression Strength: 2 to 5 psi (at 25% deflection).
      f. Working Temperature: -40 to 160 degrees F.
      g. Water Absorption by Weight: 5% maximum.
      h. Flammability: HF-1 as per UL 94.

2.03 SOURCE QUALITY CONTROL

A. Testing and analysis of components will be performed under provisions of Section 014500 - QUALITY CONTROL.

B. Inspection and tests will not relieve the Contractor of responsibility for providing materials and fabrication and erection procedures in compliance with specified requirements. The Contractor is to verify that all materials meet or exceed the requirements specified in these specifications.

C. Materials not in compliance with the specified requirements will be rejected

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected. Beginning of installation means that the installer accepts the existing conditions.

3.02 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Clean all bearing surfaces of debris and foreign matter.

E. Verify bearing surface is smooth and flat.

F. Bear decking on steel supports with 1 1/2 inch (38 mm) minimum bearing.

G. Provide decking free of amounts of lubricants or oils which would impair the adhesion of spray on fireproofing or painting.

H. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

I. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

J. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

K. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

L. Fasten deck to steel support members at ends and intermediate supports with fusion welds at 12 inches on center maximum, parallel with the deck flute and at each transverse flute. Weld washers are to be used only with decks 24 gauge or thinner.

M. Mechanically fasten male/female side laps at 24 inches on center maximum for decking thinner than 20 gauge. Weld male/female side laps at 18 inches on center maximum for decks 20 gauge and heavier.

N. Reinforce steel deck openings from 6 to 18 inches (150 to 460 mm) in size with 2 inches x 2 inches x 1/4 inch (50 mm x 50 mm x 6 mm) steel angles. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.

O. Install 6 inch (150 mm) minimum wide sheet steel cover plates, of same thickness as decking, where deck changes direction. Fusion weld 12 inches (300 mm) on center maximum.

P. Install sheet steel closures and angle flashings to close openings between deck and walls, columns and openings.

Q. Install single row of foam flute closures above walls and partitions perpendicular to deck flutes.

R. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

S. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.03 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:
   1. Weld Diameter: 3/4 inch (19 mm), nominal.
   2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches (305 mm) apart in the field of roof and 6 inches (150 mm) apart in roof corners and perimeter based on roof-area definitions in FMG Loss Prevention Data Sheet - FM DS 1-28.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 18 inches (457 mm), and as follows:
   1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
   2. Mechanically clinch or button punch.
   3. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds where deck is thicker than 20 gauge.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
   1. End Joints: Lapped 2 inches (51 mm) minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck flutes. Space welds not more than 6 inches apart with at least one weld at each corner.
   1. Install reinforcing channels or zees in ribs to span between supports and weld .

E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

F. Place metal cant strips in position and fusion weld.

G. Install sheet steel closures and angle flashings to close openings between deck and walls, columns and openings.

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.05 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Stud wall framing.
   2. Flat ceiling and attic floor joist framing.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of cold-formed steel framing product and accessory.

B. Shop Drawings:
   1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
   2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
   3. The design of the cold-formed steel framing shall be the responsibility of the contractor's fabricator. The sizes (depth) of the steel studs shall be as shown on the contract drawings. Unless specifically indicated on the construction documents, it shall be the responsibility of the design engineer to size the spacing and gauge of the element as well as the total depth of the member in the case of header and sill design.
   4. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   5. The contractor's fabricator shall provide a full set of engineering calculations as well as a complete set of shop drawings affixed with a New York State Professional Engineer's sign and seal. The design of the cold-formed steel elements shall be in conformance with the information shown on the contract documents and shall be in accordance with the 2025 Building Code of New York State.

C. Fabrication Drawings:
   1. Prior to fabrication submit fabrication and erection drawings for review and approval by the architect/ engineer. Indicate component details, framing for openings, bearing anchorage, temporary bracing, welds or type and location of mechanical fasteners and accessories or items required of other work for complete installations. Included manufacturer's instructions for securing studs to tracks and for other framing connections.
   2. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.04 QUALITY ASSURANCE

A. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

B. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

C. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. 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. ClarkDietrich Building Systems, LLC.
   2. MarinoWARE
   3. Architect/ Engineer approved equivalent.

2.02 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
   1. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
      a. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft.

2.03 COLD-FORMED STEEL FRAMING, GENERAL

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

B. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
   1. Grade: ST33H.
   2. Coating: G90 or equivalent.

C. Steel Sheet for Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:
   1. Grade: 50, Class 1 or 2.
   2. Coating: G90.

D. All studs and/or joists and accessories shall be the type, size, gage, and spacing shown on the plans. Studs, runners (track) bracing, and bridging shall be manufactured per ASTM C955.

E. All galvanized studs, joists, and accessories shall be formed from steel that conforms to the requirements of ASTM A653/A653M, as set forth in Section 1.02 of the AISI specification for design of cold-formed steel structural members.

F. All galvanized studs joists and accessories shall have a minimum G60 coating.

G. Minimum steel gauges shall be 18 gauge for all structural elements subject to gravity and/or lateral wind forces.

H. Minimum steel gauge for interior elements subject to partition loadings shall be 20 gauge.

I. All section properties shall be calculated in accordance with the AISI specification for the design of cold-formed steel structural members (latest edition).

J. Facing materials may not be substituted for bridging. Horizontal bridging must be installed prior to loading the wall and/or floor/roof joists.

K. The physical and structural properties published by approved supplier will be accepted; otherwise these properties must be substantiated by calculations for loading stresses and deflections of the designed framing sealed by a professional engineer licensed in the State of New York.

L. Prior to fabrication submit fabrication and erection drawings for review and approval by the architect/ engineer. Indicate component details, framing for openings, bearing anchorage, temporary bracing, welds or type and location of mechanical fasteners and accessories or items required of other work for complete installations. Included manufacturer's instructions for securing studs to tracks and for other framing connections.

2.04 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch, 18 gauge or as indicated on the construction documents..
   2. Flange Width: 2 inches, minimum.

2.05 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

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. Stud kickers and knee braces.
   7. Hole reinforcing plates.
   8. Backer plates.

2.06 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.

B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.

C. 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 E488/E488M conducted by a qualified testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.

E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.07 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A780/A780M.

B. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C1107/C1107M, with fluid consistency and 30-minute working time.

C. Shims: Load bearing, high-density multimonomer plastic, and non-leaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

D. 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.

2.08 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
   1. Fabricate framing assemblies using jigs or templates.
   2. Cut framing members by sawing or shearing; do not torch cut.
   3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
   4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
   1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
   2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.03 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
   1. Cut framing members by sawing or shearing; do not torch cut.
   2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work. Welds may be butt, fillet, spot or groove type. The appropriateness of which shall be determined by and

within the design calculations. All welds shall be touched-up using zinc -rich paint to galvanized members and paint similar to that used by the manufacturer for painted members.

b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

G. Install insulation, specified in Section 072100 - THERMAL INSULATION in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

I. Erection Tolerances: Install cold-formed steel framing 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 no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

J. Wire tying in structural applications is not permitted.

3.04 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

3.05 TOLERANCES

A. Vertical alignment (plumbness) of studs shall be within 1/8 inch in 4 feet of the span.

B. Horizontal alignment (levelness) of walls shall be within 1/8 inch in 4 feet of their respective lengths.

C. Spacing of studs shall not be more than +1/8 inch from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.

END OF SECTION

`PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Steel Angles and Miscellaneous Metal supports.
   2. Loose bearing, Lintels and leveling plates for applications where they are not specified in other Sections.

B. Products furnished, but not installed, under this Section include the following:
   1. Loose steel lintels.
   2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.03 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. 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.

1.04 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
   1. Steel Angles and Miscellaneous Metal supports.
   2. Loose steel lintels.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Welding certificates.

1.06 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.07 FIELD 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 the 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 with established dimensions.

PART 2 - PRODUCTS

2.01 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
   1. Size of Channels: or as indicated.
   2. Material: Galvanized steel, ASTM A653/A653M, commercial steel, Type B, with G90 coating; 0.108-inch nominal thickness.

D. Aluminum Extrusions: ASTM B221, Alloy 6063-T5 or 6.

2.02 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners.
   1. Provide stainless-steel fasteners for fastening aluminum.

B. Steel Bolts and Nuts: Regular hexagon-head bolts,ASTM A307 , Grade A; with hex nuts, ASTM A653/A653M; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
   1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

D. Plain Washers: Round, ASME B18.22.1.

E. Anchors, General: Anchors capable of sustaining, 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 E488/E488M, conducted by a qualified independent testing agency.

2.03 MISCELLANEOUS MATERIALS

A. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

D. Non-shrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, non-gaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

E. Concrete: Comply with requirements in Section 033000 - CAST-IN-PLACE CONCRETE for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 4000 psi.

2.04 FABRICATION, GENERAL

A. Shop Assembly: Pre-assemble items 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 exposed work with accurate angles and surfaces and straight edges.

D. 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. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.

4. 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.

E. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

F. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

G. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

H. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.05 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.
   1. Fabricate units from slotted channel framing where indicated.

C. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.
   1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
   2. Unless otherwise indicated, provide 1/2-inch baseplates with four 5/8-inch anchor bolts and 1/4-inch top plates.

D. Galvanize miscellaneous framing and supports where indicated.

2.06 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Hot Dip Galvanize plates (2.0 oz. / sq. ft.).

2.07 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Galvanize loose steel lintels located in exterior walls - Hot Dip Galvanize (2.0 oz. / s.f.).

2.08 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.09 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M and ASTM A653/A653M for other steel and iron products.
   1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer primers specified in Section 099113 - EXTERIOR PAINTING unless indicated otherwise.

PART 3 - EXECUTION

3.01 EXAMINATION

A. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

B. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

3.02 INSTALLATION, GENERAL

A. Install all factory-fabricated items in accordance with the manufacturer's specifications and recommendations.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

D. Field Welding: Comply with the following requirements:
   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. 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.

E. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, and other connectors.

F. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

G. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
   1. Cast Aluminum: Heavy coat of bituminous paint.

3.03 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for securely to, and rigidly brace from, building structure.

C. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

3.04 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with non-shrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.05 PROTECTION

A. Protect installed products until completion of project.

3.06 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting."

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Aluminum pipe and tube railings.

1.03 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials in accordance with ANSI/NAAMM AMP 521 - latest edition and based on the following:
   1. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.

C. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Handrails and Top Rails of Guards:
      a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
      b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.
   2. Infill of Guards:
      a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
      b. Infill load and other loads need not be assumed to act concurrently.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
   1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.04 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Manufacturer's product lines of mechanically connected railings.
   2. Railing brackets.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

1.06 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

B. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural anchorage members and other construction contiguous with metal fabrications by field measurements before fabrication.

1.08 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. 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. Aluminum Pipe and Tube Railings:
      a. Blum, Julius & Co., Inc.
      b. Braun, J. G., Company; a division of the Wagner Companies.
      c. Wagner, R & B, Inc.; a division of the Wagner Companies.
      d. Or approved equal.

2.02 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.03 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

B. Drawn Seamless Tubing: ASTM B210/B210M, Alloy 6063-T832.

C. Plate and Sheet: ASTM B209/B209M, Alloy 6061-T6.

D. Die and Hand Forgings: ASTM B247, Alloy 6061-T6.

E. Castings: ASTM B26/B26M, Alloy A356.0-T6.

2.04 FASTENERS

A. General: Provide the following:
   1. Aluminum Railings: Type 316 stainless-steel fasteners.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads. ASTM E894.

C. Fasteners for Interconnecting Railing Components:
   1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
   2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.

3. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

2.05 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
   1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Shop Primers: Provide primers that comply with Section 099123 - Interior Painting

E. Intermediate Coats and Topcoats: Provide products that comply with Section(s) 099123 - Interior Painting.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

G. Non-shrink, Non-metallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

H. Anchoring Cement: Factory-packaged, non-shrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
   1. Water-Resistant Product: At exterior locations and where indicated, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.06 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. 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. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. 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.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   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 flux immediately.
   4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

J. Form changes in direction as follows:
   1. As detailed.

K. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of railing members with prefabricated end fittings.

M. 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 (6 mm) or less.

N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
   1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

P. Woven-Wire Mesh Infill Panels: Fabricate infill panels from woven-wire mesh crimped into 1 inch by 1/2 inch by 1/8-inch metal channel frames. Make wire mesh and frames from same metal as railings in which they are installed.

2.07 FINISHES, GENERAL

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. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.08 ALUMINUM FINISHES

A. Powder Coat Paint Meeting AAMA 2604 coating.
   1. U.V. resistance and scratch & mar resistance formula shall consist of super durable TGIC polyester resin system with flocked and color stable full pigmentation.
   2. Chemical pretreatment:
      a. Alkaline cleaner applied at 160 degrees F. for duration of 3 to 5 minutes.
      b. D.I. (Deionized) water rinse.
      c. Conversion phosphate coating applied at 140 degrees F. for 3 to 5 minutes.
      d. D.I. water rinse.
      e. Application on non-chromate, chrome sealer amorphous chromium phosphate that meets or exceeds ASTM D1730, Type B, Method 5.
      f. D.I. water rinse, and dry in place.
   3. Coating Application:
      a. Electrostatic application of super TGIC system powder with a minimum dry film thickness of 3.5 to 5.5 mils cured coating.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine construction to ensure that aluminum support angles are in place to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.02 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
   1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
   2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).

C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with wood, or dissimilar metals, with a heavy coat of bituminous paint.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening: Use anchorage devices and fasteners for securing railings and for properly transferring loads to adjoining support structure.

3.03 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Expansion / Slip Movement Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches (150 mm) of post.

3.04 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, non-metallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Leave anchorage joint exposed with 1/8-inch (3-mm) buildup, sloped away from post.

C. Anchor posts to metal surfaces with circular flanges floor type as required by conditions, connected to posts and to metal supporting members as follows:
   1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.

3.05 ATTACHING RAILINGS

A. Anchor railing ends at decks with round flanges anchored to deck construction and welded to railing ends.

B. Anchor railing ends to metal surfaces with flanges through bolted to metal surfaces and flanged Escutcheons welded to railing ends.

C. Attach railings to wall with wall brackets, except where end flanges are used. Provide brackets with 1-1/2-inch (38-mm) 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.

3.06 ADJUSTING AND CLEANING

A. Clean aluminum by washing thoroughly with clean water and soap and rinsing with clean water.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123 - Interior Painting

3.07 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Treated Wood Members.
   2. Plywood Subfloors.
   3. Fasteners.
   4. Wood blocking, cants, and nailers.
   5. Wood furring and grounds.

1.03 REFERENCES:

A. AITC - American Institute of Timber Construction.

B. APA PRP-108 - Performance Standards and Qualification Policy for Wood Structural Panels (Form E445); 2021.

C. ASTM D2559 - Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions; 2012a (Reapproved 2024).

D. ASTM D5456 - Standard Specification for Evaluation of Structural Composite Lumber Products; 2021, with Editorial Revision.

E. AWPA U1 - Use Category System: User Specification for Treated Wood; 2025.

F. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   1. Currently: ___

G. PS 1 - Structural Plywood; 2023.

H. PS 2 - Performance Standard for Wood Structural Panels; 2019.

1.04 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   1. NeLMA: Northeastern Lumber Manufacturers' Association.
   2. NLGA: National Lumber Grades Authority.
   3. SPIB: The Southern Pine Inspection Bureau.
   4. WCLIB: West Coast Lumber Inspection Bureau.
   5. WWPA: Western Wood Products Association.

1.05 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
   2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.06 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:
1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Plywood.
4. Shear panels.
5. Power-driven fasteners.
6. Powder-actuated fasteners.
7. Expansion anchors.
8. Metal framing anchors.

1.07 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Handle, Transport and Store Plywood Panels in accordance with the APA Storage and Handling recommendations.

B. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

A. Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship" for the following:
1. Dimension lumber framing.
2. Miscellaneous lumber.

B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

C. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness 15 percent for 2-inch nominal thickness or less, no limit for more than 2-inch nominal thickness unless otherwise indicated.

2.02 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; UC2 (Interior Construction - Above Ground - Damp) for interior construction not in contact with the ground, Use Category UC3B (Above Ground Exposed) for exterior construction not in contact with the ground, and UC4B (Ground Contact or Fresh Water - Heavy Duty) for items in contact with the ground.
   1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
   2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
   1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat items indicated on Drawings, and the following:
   1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
   3. Wood floor plates that are installed over concrete slabs-on-grade.

2.03 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
   1. Use treatment that does not promote corrosion of metal fasteners.
   2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
   3. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D5664 and design value adjustment factors shall be calculated according to ASTM D6841.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency. Mark panels on surfaces that will not be exposed in the final construction.
   1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat items indicated on Drawings, and the following:
   1. Concealed blocking.
   2. Framing for non-load-bearing exterior walls.
   3. Roof construction.

2.04 DIMENSION LUMBER FRAMING

A. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
   1. Species and Grade: Southern pine; No. 1 grade; SPIB.
   2. Species and Grade: Douglas fir-south; No. 1 grade; WWPA.
   3. Species and Grade: Hem-fir; No. 1 grade; WCLIB or WWPA.

2.05 PLYWOOD SUBFLOORS

A. Plywood Subflooring: 3/4 Performance category APA Rated STURD-I-FLOOR, 24" o.c., Group 1, Exterior, 48 inch by 96 inch, B-C face grades, Tongue and Groove (T&G) edges.

2.06 CONSTRUCTION MOUNTING PANELS

A. Communications and Electrical Room Mounting Boards: PS 1, APA rated A-D faced plywood or MDF; 3/4 inch thick; flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.07 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
   1. Blocking.
   2. Nailers.
   3. Grounds.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and any of the following species:
   1. Hem-fir (north); NLGA.
   2. Mixed southern pine; SPIB.
   3. Hem-fir; WCLIB or WWPA.
   4. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:
   1. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
   2. Eastern softwoods; No. 2 Common grade; NeLMA.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.08 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
   1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or Type 304 stainless steel.

B. Power-Driven Fasteners: NES NER-272.

C. Wood Screws: ASME B16.1.

D. Lag Bolts: ASME B18.2.1.

E. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers.

F. 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 assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E488/E488M conducted by a qualified independent testing and inspecting agency.
   1. Material: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.

2.09 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

B. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION OF SURFACES

A. Surfaces to receive new wood members shall be free of all dirt, debris, and loose materials. Exposed surfaces shall be mechanically scraped if necessary, to remove projections.

B. Surfaces shall have no free water present in any form (rain, dew, frost, snow or ice).

C. Contractor is responsible to inspect all exposed surfaces to see that conditions are satisfactory for installation of new work.

3.02 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Place horizontal members flat, crown side up.

C. Coordinate installation of adjacent construction.

D. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.

E. Do not splice structural members between supports unless otherwise indicated.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
   1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
   1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
   2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
   3. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. NES NER-272 for power-driven fasteners.
   2. Table 2304.10.1, "Fastening Schedule," in ICC's "International Building Code" and the 2025 Building Code of New York State".

3.03 WOOD GROUND, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.04 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

3.05 STAIR FRAMING INSTALLATION

A. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:
   1. Size: 2-by-12-inch nominal size, minimum.
   2. Material: solid lumber.
   3. Notching: Notch rough carriages to receive treads, risers, and supports; leave at least 3-1/2 inches of effective depth.
   4. Spacing: At least three framing members for each 36-inch clear width of stair.

B. Provide stair framing with no more than 3/16-inch variation between adjacent treads and risers and no more than 3/8-inch variation between largest and smallest treads and risers within each flight.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items.

B. Wood casings and moldings.

C. Hardware and attachment accessories.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with plumbing rough-in, electrical rough-in, installation of associated and adjacent components, and provision of plumbing fixture templates.

1.03 SUBMITTALS

A. See Section 013300 - SUBMITTALS for submittal procedures.

B. Product Data:
   1. Provide data on fire retardant treatment materials and application instructions.
   2. Provide instructions for attachment hardware, finish hardware, and support hardware.

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 finish plywood, 6 x 6 inch (152 x152 mm) in size illustrating wood grain and specified finish.

E. Samples: Submit two samples of wood trim 6 inch (152 mm) long.

F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five 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.
   2. Single Source Responsibility: Provide and install this work from single fabricator.

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.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

PART 2 PRODUCTS

2.01 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.

2.02 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

B. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless indicated otherwise, and provided it is clean and free of contamination, identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc. (ALSC).

2.03 LUMBER MATERIALS

A. Hardwood Lumber: White Oak species, Abrasive Planed, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

2.04 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.

2.05 ACCESSORIES

A. Lumber for Shimming and Blocking: Softwood lumber of Cedar or Pine species.

B. Primer: As specified in Section 099123.

C. Wood Filler: Solvent base, tinted to match surface finish color.

2.06 WOOD TREATMENT

A. Wood Preservative by Pressure Treatment (PT Type): ProvideAWPA U1 treatment using waterborne preservative with 0.25 percent retainage.

B. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

C. Redry wood after pressure treatment to maximum 15 percent moisture content.

2.07 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.

2.08 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

D. 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 - 12, Polyurethane, Water-based.
      b. Stain: As selected by Architect/Engineer.
      c. Sheen: Flat.

E. Back prime woodwork items to be field finished, prior to installation.

PART 3 EXECUTION

3.01 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.

C. See Section 061000 - Rough Carpentry for installation of recessed wood blocking.

3.02 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.

D. Install hardware in accordance with manufacturer's written instructions.

3.03 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment in accordance with manufacturer's instructions.

B. Brush apply one coat(s) of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.

3.04 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: See Section 099123.

C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.05 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

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Polyisocyanurate foam insulation with foil facers
   2. Vapor retarders.

1.03 ACTION SUBMITTALS

A. See Section 013300 - SUBMITTALS, for submittal procedures.

B. Product Data: For each type of product indicated.

C. Manufacturer's Certificate: Certify panels will conform to specified performance requirements.

1.04 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.05 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.06 PRE-INSTALLATION MEETING

A. Pre-Installation Meeting: Convene minimum one week prior to commencing Work of this section. Review installation procedures and coordination required with Related Work and include the following:
   1. Participants: Authorized representatives of the Contractor, Architect, Installer, and Manufacturer.
   2. Review wall assemblies for potential interference and conflicts and coordinate layout and support provisions for interfacing work.
   3. Review continuous insulation wall panels installation methods and procedures related to application, including manufacturer’s installation guidelines.
   4. Review firestopping requirements and weather resistive membrane requirements and placement locations.
   5. Review field quality control procedures.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:
   1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
   3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

C. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.01 POLYISOCYANURATE BOARD INSULATION

A. Acceptable Manufacturer: Insulating panels shall be XCI products produced by Hunter Panels, 15 Franklin Street, Portland, Maine 04101. Phone: (207) 761-5678 or (888) 746-1114. Fax: (877) 115-1769. E-mail: info@hpanels.com.
   1. Architect approved equivalent.

B. Board Insulation with Foil Facers: Hunter Panels Xci Foil (Class A) complies with ASTM C1289 and ASTM E84 Class A (25 or less) Panels are a high thermal resistive rigid insulation panel composed of a closed cell polyisocyanurate foam core bonded on both sides to reinforced foil facers.
   1. Type: ASTM C1289, Type I (Foil-facers on each side of foam core)
      a. Grade 3 (25 psi).
      b. Panel Size:
         1) 4 feet by 8 feet (1220 mm by 2440 mm) and 4 feet by 4 feet (1220 mm by 1220 mm)
      c. R Value: ASTM C518 at 75 degrees F (23.9 degrees C). Provide thickness requirements indicated on the drawings
         1) 2.0 inches (51 mm) / R Value 13.0 and 4.0 inches (100 mm) / R Value 25.2

C. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.

D. Panel fasteners shall be corrosion resistant type as approved by the panel manufacturer. Length of fasteners shall be as recommended by the panel manufacturer

2.02 MINERAL-WOOL BLANKET INSULATION

A. 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. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
   3. Products:
      a. Johns Manville; MinWool Sound Attenuation Fire Batts: www.jm.com/#sle.
      b. Knauf Insulation; EcoBatt Insulation: www.knaufinsulation.com/#sle.
      c. ROCKWOOL (ROXUL, Inc); AFB evo™: www.rockwool.com/#sle.
      d. Thermafiber, Inc; SAFB FF: www.thermafiber.com/#sle.
      e. Owens Corning.- Thermafiber® RainBarrier HD (R-4.3 per inch, 6.0 pcf.)
   4. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 40 percent.

B. Mineral-Wool Blanket Cavity Insulation: CAVITYROCK Black; ASTM C612 Type IVB, Class A (faced surface with a flame-spread index of 25 or less per ASTM E84);
   1. Complies with NFPA 285 requirements for wall assemblies.
   2. Size: 24 inches wide as indicated on the drawings x 48 inch lengths.
   3. Thickness: 3 inches (76 mm) or as indicated on the drawings.
   4. Edges: Square
   5. Density:
      a. Outer layer: 6.2 pcf, ASTM C612.
      b. Inner layer: 3.8 pcf, ASTM C612.
   6. R value: 4.3 per inch (1 and 2 inch thick products) and 4.3 per inch for 2.5 to 6 inch thicknesses.
   7. Fungi Resistance: Zero mold growth when tested in accordance with ASTM C1338.
   8. Moisture Resistance: Absorption of less than 0.03 percent by volume.
   9. Water Vapor Permeance: 27 perm (1555 ng/(Pa s sq m)), maximum, at 1 inch (25 mm) thick when tested in accordance with ASTM E96/E96M, desiccant method.

10. Metallic Corrosion Resistance: Noncorrosive/passed, when tested in accordance with ASTM C665 for steel, and ASTM C795 for stress corrosion cracking tendency of austenitic stainless steel.
11. Melting Point: 2,150 degrees F (1177 degrees C), minimum.
12. Note: Provide CAVITYROCK BLACK where indicated on the drawings and at all Rainscreen applications.

2.03 VAPOR RETARDERS - LOW PERMEANCE

A. Reinforced-Polyethylene Vapor Retarders: Two outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb/1000 sq. ft., with maximum permeance rating of 0.0507 perm.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Raven Industries Inc.; DURA-SKRIM 6WW.
      b. Reef Industries, Inc.; Griffolyn T-65.
      c. Stego Industries, LLC StegoWrap 15 mil
      d. or approved equal.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

D. Single-Component Nonsag Urethane Sealant: ASTM C920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.

E. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.

F. Foil Type Wall Vapor Barriers: Foil faced, scrim-reinforced kraft Vapor Barrier material, ASTM C1136, Type II, IV; with 0.0003 inch Aluminum Foil face, 0.0001 inch Elastomeric Polymer Barrier Coating, Tri-directional fiberglass reinforcing, flame resistant adhesive and 0.01 lb. / sq. ft. Natural Kraft backing. Product shall be R-3035 Foil Scrim / Kraft as manufactured by Lamtec® Corporation or approved equal.

2.04 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
   1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
   1. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
      a. Ceiling plenums.

C. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.

D. Insulation Fasteners: Lengths of galvanized, 13 gauge, 0.072 inch (1.83 mm) high carbon spring steel with chisel or mitered tips, held in place by tension, length to suit insulation thickness and substrate, capable of securely supporting insulation in place.

E. Insulation Fasteners: Impaling clip of galvanized 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.

F. Wire Mesh: Galvanized steel, hexagonal wire mesh.

G. Adhesive: Gun grade, interior and exterior, and compatible with insulation and substrates; complies with ASTM C557.
   1. Application Temperature: 40 to 100 degrees F (5 to 38 degrees C) at contact surfaces.
   2. Volatile Organic Content (VOC): Less than 7 percent by weight.

H. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

3.02 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.03 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
   1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 04

3.04 INSTALLATION OF VAPOR RETARDERS

A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

C. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.05 CLEANING

A. Progress Cleaning: Perform cleanup as work progresses in accordance with Section 011400 - WORK RESTRICTIONS and 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 017423 - CLEANING.

C. Waste Management:
   1. Coordinate recycling of waste materials with Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

3.06 PROTECTION

A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes vapor-permeable, fluid-applied air and water barriers.

1.03 DEFINITIONS

A. Weather Barrier: A combination of materials and accessories that do the following:
   1. Prevent the accumulation of water as a water-resistive barrier.
   2. Minimize the air leakage into or out of the building envelope as a continuous air barrier.
   3. Provide sufficient water vapor transmission to enable drying as a vapor permeable membrane.

B. Water-Resistive Barrier: A combination of materials and accessories that prevent the accumulation of water within the wall assembly in accordance with IBC Section 1403.2.
   1. Primary Layer: Water-resistive barrier (fluid-applied) installed closest to building interior with all flashings and terminations integrated to this layer.
   2. Secondary Layer: Outermost part of a double-layer system and where drainage is required behind claddings such as stucco, adhered masonry, and installation methods utilizing a lath.

C. Continuous Air Barrier: The combination of interconnected materials, assemblies, and sealed joints and components of the building envelope that minimize air leakage into or out of building envelope in accordance with ASHRAE 90.1 Section 5.4.3.1.

D. Vapor-Permeable Membrane: The property of having a water-vapor permeance rating of 10 perms or greater, when tested in accordance with the desiccant method using Procedure A of ASTM E96 in accordance with definition in International Building Code. Vapor-permeable material permits passage of moisture vapor through vapor diffusion.

E. Vapor Diffusion: A slow movement of individual water vapor molecules from regions of higher to lower water vapor concentration (higher to lower vapor pressure).

1.04 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Meet with Owner, Architect, Manufacturer's Certified Installer, weather barrier manufacturer's designated field representative, and installers of work that interfaces with or affects weather barrier.
   2. Review methods and procedures related to weather barrier installation, including manufacturer's written instructions.
   3. Review and finalize construction, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Examine substrate conditions and finishes for compliance with requirements.
   5. Review flashings, special weather barrier details, weather barrier penetrations, and condition of other construction that affects weather barrier.
   6. Review weather barrier manufacturer's Project registration and observation process.
   7. Review Construction Indoor Air Quality Management Plan "Moisture Protection for Absorbent Materials."
   8. Review temporary protection requirements for weather barrier during and after installation.

1.05 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. For weather barrier, include data on air and water-vapor permeance based on testing in accordance with referenced standards.

B. Sustainable Design Submittals:
   1. Test Reports: Envelope testing and verification of the following:

a. Water-Spray Test.
b. Air Infiltration Test.
c. Water Penetration Test.

2. Product Data: Including the following information:
   a. Provide Health Product Declarations (HPDs).
   b. Provide Environmental Product Declarations (EPD's).
      1) Commercial weather barrier complies with California Department of Public Health (CDPH) Standard.
      2) Adhesives and sealants wet-applied on-site that meet/exceed VOC content requirements for wet applied products comply with SCAQMD Rule 1168.
      3) Flashing systems comply with SCAQMD Rule 1168 on VOC limits.

C. Manufacturer's Instructions: For installation of each product specified.

D. Qualification Data: For Installer, laboratory mockup testing agency and field testing agency..

E. Sample Warranty: For manufacturer's warranty.

F. Installer Qualifications: A qualified firm that is certified by weather barrier system manufacturer to install manufacturer's product.

G. Mockups: Build mockups to set quality standards for materials and execution.
   1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
      a. ASTM E 331 Test Parameters: 2.86 psf (137 Pa) pressure for 15-minute duration.
      b. AAMA 501.1 Test Parameters: 2.86 psf (137 Pa) pressure for 15-minute duration.
      c. AAMA 501.5 Test Parameters:
         1) Cycle Temperature Range: 0 to 180 deg F (-18 to +82 deg C).
         2) Number of Cycles: 3.
         3) Repeat test ASTM E 331 after thermal cycling.
   2. Warranty Period: 15 years from date of product purchase.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations: Obtain weather barrier assembly components, including weather barrier, weather barrier flashing and foam insulation from same manufacturer as weather barrier or manufacturer approved by weather barrier manufacturer.

2.02 PERFORMANCE REQUIREMENTS

A. High-Performance Installations:
   1. For installation with one of the following building envelope performance or structural characteristics:
      a. Exceeding 65 mph (100 km/h) equivalent structural load.
      b. Exceeding 15 mph (24 km/h) equivalent wind-driven rain water infiltration.
      c. Buildings with 60 feet (18 m) or more total height above grade plane, as defined by the IBC.
      d. Construction with gypsum or cement-based exterior sheathing.
      e. Non-wood based primary structure such as steel, light-gauge steel, masonry, or concrete.

2.03 WEATHER BARRIER

A. Water Penetration Resistance, Product: Hydrostatic-head resistance greater than 92.5 inches (235 cm) in accordance with ASTM E331.

B. Weather barrier system shall have a VOC content of 30 g/L or less.

2.04 WEATHER BARRIER FLASHING

A. Conformable Weather Barrier Flashing: Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure of 176 deg F (80 deg C) for seven days.
   1. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; FlexWrap™ NF.
      a. Or approved equal.
   2. Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.

B. Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure of 176 deg F (80 deg C) for seven days.
   1. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; Tyvek® StraightFlash™, Tyvek® StraightFlash™ VF.
      a. Or approved equal.

2.05 DRAINAGE LAYER

A. Drainage Layer: Weather barrier membrane with drainage.
   1. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; Tyvek® Fluid Applied WB+™ and CommercialWrap® D.
      a. Or approved equal.
   2. Drainability: 98 percent or greater when tested in accordance with ASTM E 2273.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
   1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
   2. Verify that substrates have cured and aged for minimum time recommended in writing by weather barrier manufacturer.
   3. Verify that substrates are visibly dry and frost-free.
      a. Fluid-applied weather barrier may be applied to damp surfaces.
      b. Surfaces are considered damp if there is no visible water on the surface, and no transfer of water to the skin when touched.
      c. Apply accessory products only to clean and dry surfaces.
   4. Verify that substrates are free of efflorescence and mold.
   5. Verify that masonry joints are flush and filled with mortar.
   6. Verify that top-of-wall system has been capped or covered to prevent water getting behind the facade and into wall cavity.
   7. Verify continuous path for moisture drainage.
      a. Verify that continuous path for drainage is not blocked or disrupted, which results in excess moisture buildup in wall cavity.
   8. Verify that surfaces to receive weather barrier are above grade.

B. Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation.
   1. Verify that rough sill framing for doors and windows slopes downward towards the exterior and is level across width of opening.

C. Verify air and surface temperatures are above 25 deg F (4 deg C) with a maximum surface temperature of 140 deg F (60 deg C). Do not install once ambient temperature exceeds 95 deg F (35 deg C), unless surface is shaded.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate in accordance with manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

C. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

D. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

E. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

F. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

G. When spraying is method of application, taper ends of the joint treatment to assist maintaining a wall system free of pinholes and voids

H. Treat all non-moving transition joints to beams, columns, and dissimilar materials by applying a 2 inch (50-mm) wide by 60-mil (1.5-mm-) thick coat of fluid-applied flashing across the joint.

I. Apply 25-mil- (0.6-mm-) thick coat of fluid-applied flashing, extending a minimum 2 inches (51 mm) on each surface, and treat the following conditions:
   1. Joints up to 1/4 inch (6 mm).
   2. Joints 1/4- to 1/2-inch (6- to 13-mm); reinforce with fiberglass-mesh tape.
   3. Joints and transitions up to 1 inch (25 mm); treat using strip flashing.

J. Bridge [isolation joints] [expansion joints] [and] discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement in accordance with manufacturer's written instructions and details.

K. When spraying is method of application, taper ends of fluid applied corner treatment to wall substrate.

L. Treat inside and outside corners by applying a 25-mil- (0.6-mm-) thick coat of fluid applied weather barrier a minimum 2 inches (50 mm) on each adjoining surface. Apply fillet bead of fluid-applied sealant to inside corners to ensure continuity. Alternatively, treat corners using strip flashing. Press strip flashing into inside corners; ensure that it is fully adhered to substrate.

M. Seal penetrations using fluid-applied flashing or sealant. Extend fillet bead 1/2 inch (13 mm) onto both surfaces.

N. Treat embedded masonry anchors by applying a coat of fluid-applied weather barrier or fluid-applied flashing around base of the anchor.

3.03 ACCESSORIES INSTALLATION

A. Install accessory materials in accordance with air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
   1. Coordinate installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
   2. Install transition strip on roofing membrane or base flashing, for a minimum 3 inches (75 mm) coverage over each substrate.
   3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow to dry.
   4. Use recommended primer when applying self-adhered flashing products on concrete, masonry, and fiber faced exterior gypsum board substrates. Priming is generally not required for adhering self-adhered flashing products to wood. However, adverse weather conditions or colder temperatures may require a primer to promote adhesion. Priming is not

required when applying fluid-applied products, except on cut edges of exterior gypsum sheathing.

5. Apply pressure along entire surface of strip flashing for good bond using a J-roller or firm hand pressure. Remove all wrinkles and bubbles by smoothing surface and repositioning as necessary.

B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

C. When applying self-adhered flashing products over a cured fluid-applied membrane, first apply a wet bed of fluid-applied product.

D. Seal fasteners of mechanically attached supports or furring strips in high-performance building envelope designs.
   1. Apply double-sided butyl tape to back of support bracket at fastener location.
   2. Embed support bracket into an additional wet bed of fluid applied product.
   3. Adhere butyl-based flashing patch to wall at fastener location.
   4. Use alternate method as approved by the manufacturer.

E. At end of each working day, seal top edge of strips and transition strips to substrate with manufacturer approved product.

F. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Flashing Sill Area for Windows and Doors:
   1. Use 6-inch (150-mm-) wide conformable flashing for 2 by 4-inch (50- by 100-mm) framing and 9-inch (220-mm-) wide conformable flashing for 2 by 6-inch (50- by 150-mm) framing. When rigid back dams are required or desired, one option to use is a 3/4-inch (19 mm) corner guard (back dam), cut to length of sill, and nailed into place on interior edge of sill prior to installation of 9-inch (220-mm-) wide conformable flashing. Afterward, install 9-inch (220-mm-) wide conformable flashing over sill and corner guard back dam.
   2. Install without stretching conformable flashing when installing along sills or jambs. Conformable flashing is intended to be stretched when covering corners or curved sections.

H. Apply fluid-applied flashing products from head of opening down. Use a corner trowel to smooth corners.

I. Repairs:
   1. Coat small damaged areas with layer of fluid-applied product.
   2. Reinforce large damaged areas with fiberglass mesh or replace damaged substrate before reapplying fluid-applied product.

3.04 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

A. Apply air-barrier material to form a seal with strips and transition strips, and to achieve a continuous air barrier in accordance with air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.
   1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
   2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
   3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.
   4. Fluid applied products may be overcoated once a touch-free skin has formed. Exterior insulation and cladding may be installed once the membrane has cured sufficiently to resist damage during installation.

B. Apply air barrier material in accordance with air-barrier manufacturer's written instructions and recommendations.
   1. Roller Application:
      a. Nap rolling: Use a roller cover with a 1/2- to 3/4-inch (13- to 19-mm) nap.
   2. Spray Application:
      a. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
      b. Use spray guard.
      c. Back Rolling: Use a roller cover with a 1-1/2- to 3/4-inch (13- to 19-mm) nap. Apply fluid-applied product in a single coat at 25 mils (0.64 mm) thick. Control thickness by applying appropriate volume over a marked area and spot checking with a wet-mil gauge.

C. Integrate fluid-applied product with through-wall flashing and window and door flashing by overlapping flashing with fluid-applied product a minimum 2 inches (50 mm).

D. Inspect surfaces to ensure that fluid-applied products are continuous and free of any voids or pinholes.

E. Do not cover air barrier until it has been tested and inspected by the testing agency.

F. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.05 FIELD QUALITY CONTROL

A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

B. Testing Agency: Engage a qualified third-party testing agency to perform tests and inspections.

C. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
   1. Continuity of air-barrier system has been achieved throughout the building envelope without gaps, holes, or pinholes.
   2. Air-barrier dry film thickness.
   3. Continuous structural support of air-barrier system provided.
   4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
   5. Site conditions for application temperature, and dryness of substrates are maintained.
   6. Maximum exposure time of materials to UV deterioration not exceeded.
   7. Surfaces primed, where applicable.
   8. Laps in strips and transition strips comply with minimum requirements, are shingled in correct direction (or mastic applied on exposed edges), and are without fishmouths.
   9. Termination mastic applied on cut edges.
   10. Strips and transition strips firmly adhered to substrate.
   11. Compatible materials used.
   12. Transitions at changes in direction and structural support at gaps provided.
   13. Connections between assemblies (air-barrier and sealants) comply with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
   14. Each penetration sealed.

D. Field Quality Control Testing: Perform the following test on mockups and representative areas of structural sealant glazed curtain walls.
   1. Air Infiltration Whole Building: ASTM E2357 at not more than 0.25 cfm/sf (1.25 L/s per sq. m) at 1.57 lb/sq. ft. (75 Pa).
   2. Water Penetration: 1 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance

Requirements" Article in Part 2, but not less than 6.24 lbf/sq. ft. (300 Pa). No water penetration shall occur as defined in ASTM E331.

a. Perform a minimum of two tests in areas as directed by Architect.

3. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate in accordance with ASTM D 4541 for each 600 sq. ft. (56 sq. m) of installed air barrier or part thereof.

E. Air barriers will be considered defective if they do not pass tests and inspections.
   1. Apply additional air-barrier material, in accordance with manufacturer's written instructions, where inspection results indicate insufficient thickness.
   2. Remove and replace deficient air-barrier components for retesting as specified above.

F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

G. Prepare test and inspection reports.

3.06 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, in accordance with manufacturer's written instructions.
   1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials in accordance with air-barrier manufacturer's written instructions.
   2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Ethylene-propylene-diene-monomer (EPDM) roofing system.
   2. Cover Board.
   3. Roof Insulation.
   4. Vapor retarder.
   5. Walkway Systems.

1.03 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.04 SUBSTITUTIONS / OR EQUALS

A. Substitutions or Equals for the roofing material manufacturer and items listed in this specification shall be submitted in conformance with Division 01 and as otherwise modified by the following:
   1. A proposed Substitution/or Equal submission package must be submitted to the Architect no later than ten (10) business days prior to the bid date. Otherwise, any Substitution/or Equal other than the manufacturer specified will not be considered.
   2. Submittal to Architect shall include:
      a. Identification of Project - Project Name;
      b. Name of Submitting Bidder;
      c. Telephone and Email address of Submitting Bidder;
      d. Manufacturer’s Name of Proposed or Equal/Substitution;
      e. Model, line or material type;
      f. Equivalent line by line item comparison for each item listed in the materials section of this specification, including each of the optional accessories. Note: Each proposed item must have proposed manufacturer and model/product numbers.
      g. Addresses of two locations within 30 miles of the proposed site, where the proposed Substitution/or Equal manufacturer has installed their similar roofing product and name and telephone number of a contact person to be able to arrange a site visit.
      h. A copy of the final signed warranty signed and issued by the manufacturer for the two projects provided.
   3. Partial and/or Failure to follow any of the procedures outlined in Division 01 or above may subject the entire submission for rejection.
   4. Incomplete submissions may not be reviewed.
   5. Substitution/ or Equals if found acceptable will be approved via addenda, which will be issued to all bidder’s.
   6. In order to include an approved Substitution/or Equal in the bid, the bidder must acknowledge on the bidders bid form that the bidder intends to provide the approved Substitution/or Equal and the bidder shall also list the name of the approved Substitution/or Equal manufacturer as well on the bidders bid form. Failure of the bidder to express their intent to use the approved Substitution/or Equal as part of the bid will exclude the bidder from being able to utilize another Manufacturer from the one specified.
   7. If a bidder uses a Substitution/or Equal, the bidder will take responsibility to pay for the re-engineering and coordination of all other items that are to be provided that have been defined in the Contract Documents as additional items to the roofing system, including but not limited to all deck preparation/modifications, additional flashings or modification to existing roof drains.

1.05 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site.
   1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review the use and staging of hoisting equipment required for the project including safety OSHA regulations pertaining to operation and use of this equipment.
   5. Review Contractor's (and their Subcontractor's) responsibility to comply with OSHA regulations, requirements for provision and implementation of safety equipment and regulations. Additionally, Contractor shall keep on-site at all times a minimum of three complete additional safety units (i.e.: harnesses, rigging gear, hardhats, safety vests, etc.) for use by site visitors requiring access to the work.
   6. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
   7. Review structural loading limitations of roof deck during and after roofing.
   8. Review the location of any fresh-air intakes for the building with the building owner which may have to be covered or re-directed to maintain intakes during roofing operations.
   9. Review base flashings, special roofing details, roof drainage, roof penetrations; raising and/or replacement of equipment curbs, disconnection and re-connection of mechanical roof mounted equipment; and condition of other construction that affects roofing system.
   10. Review governing regulations and requirements for insurance and certificates if applicable.
   11. Review temporary protection requirements including but not limited to safety lines, roof barriers, walkway protections as required by OSHA during and after roofing installations.
   12. Review roof installation observations during construction; notifications and repair procedures after roofing installation with the manufacturer's field representative.
   13. Asbestos abatement work coordination.
   14. Debris removal procedures and requirements.

1.06 ACTION SUBMITTALS

A. Submittals shall be made in accordance with Section 013300 - SUBMITTALS.

B. Product Data: For each type of product.

C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:
   1. Base flashings and membrane terminations including laps, seam layout, direction of laps and flashing details.
   2. Tapered insulation, including slopes.
   3. Roof plan showing orientation of steel roof deck and orientation of roofing and fastening spacing's and patterns for mechanically fastened roofing or foam ribbon / adhesive patterns and spacing for fully adhered systems.
   4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

D. Samples for Verification: For the following products:
   1. Membrane roofing, of color required, 12 inch x 12 inch.
   2. Insulation Board - 12" x 12" sample.
   3. Cover Board - 12 inch x 12 inch.
   4. Walkway pads or rolls, of color required.

E. Manufacturers complete installation Instructions.

F. MSDS Sheets for all materials.

1.07 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
   1. Submit evidence of complying with performance requirements.

C. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency.

D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

E. Sample Warranties: For manufacturer's special warranties.

1.08 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.09 QUALITY ASSURANCE

A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.

B. Single Source Responsibility: Roofing system materials and components shall be supplied and warranted by membrane manufacturer for specified roofing system and specified membrane manufacturer's warranty and shall be in compliance with specified regulatory requirements.

C. Regulatory Requirements for Roof Assembly:
   1. Comply with Factory Mutual System Approval Guide to provide FMRC-Approved roof assembly meeting Class 1A-120 (FM 4470) requirements for fire resistance and wind uplift in accordance with FM Loss Prevention Data Sheets FM DS 1-28, FM 1-49 and FM DS 1-29.
   2. Underwriters Laboratories, Inc. (UL): Class A Fire Hazard Classification
   3. Conform to applicable code(s) for roof assembly fire hazard requirements.
   4. Conform to loading requirements indicated in ASCE 7 for applicable building location, exposure and use.
   5. Factory Mutual (FM) 1A-120 Compliance/Roof Assembly.

D. Qualifications.
   1. Manufacturer: Company specializing in manufacturing the products specified in this section with Ten (10) years documented experience.
   2. Applicator: Company specializing in performing the work of this section with Five (5) years documented experience. Installer shall be a qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
   1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
   2. All curable materials must be stored between 60° F and 80°F.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

E. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.

1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.12 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
   1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, edge materials, copings, and other components of roofing system.
   2. Warranty Period: Thirty (30) years from date of Substantial Completion with no dollar limitation (NDL) on the cost or quantity of repairs. Pro-rated roofing warranties will not be accepted.
   3. The warranty shall include coverage for wind speed with peak gusts of 120 mph measured at 30 feet above ground level. Certification is required with bid submittal indicating the manufacturer has reviewed and agreed to such wind coverage.
   4. Warranty shall also provide coverage for roof leakage caused by hail up to and including 2 inch in diameter.
   5. Materials and Workmanship for the following items shall be included in the manufacturer's warranty:
      a. Membranes.
      b. Flashings, including metal flashings and accessories supplied by roofing membrane manufacturer.
      c. Insulation.
      d. Fasteners and adhesives.
      e. Accessories.
      f. Roof drains.
      g. Roof Edge and coping systems.
   6. The warranty deliverables shall include the following:
      a. Original of the warranty with original signature of a roofing manufacturer's company official authorized to sign the warranty.
      b. An additional three copies of the signed warranty noted above.
      c. Record set of as-built roofing drawings.
      d. Final Roof Inspection Report by the manufacturer's authorized Field Representative.

B. Warranty: This project is being constructed in an existing Commercial Building with and EPDM roof having an in-place existing warranty. Contractor will be required to provide a roofing contractor that is approved by the existing roofing manufacturer. Contractor shall maintain and modify existing warranty to include the work required by this project. Contractor shall meet with and provide for all required meetings, and construction inspections by an authorized Field Representative from the Roofing manufacturer issuing and modifying / extending the current warranty. Contractor shall provide to the building owner (with a copy to the Tenant), an original Warranty copy signed by a current authorized representative of the Roofing manufacturer at the completion of the work and prior to final payment claim submittal.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations: Obtain components including roof insulation for roofing system from manufacturer approved by membrane roofing manufacturer.

2.02 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
   1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G154, or ASTM G155.
   2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D3746 or ASTM D4272.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures:
   1. Corner Uplift Pressure: -56.2 lbf/sq. ft.
   2. Perimeter Uplift Pressure: -45.9 lbf/sq. ft.
   3. Field-of-Roof Uplift Pressure: -38.2 lbf/sq. ft.

D. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low -slope roof products.

E. Energy Performance: Roofing system shall have an initial solar reflectance index of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

F. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.03 EPDM ROOFING

A. EPDM: ASTM D4637/D4637M, Type I, non-reinforced, uniform, flexible EPDM sheet.
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
      a. Elevate; Holcim Solutions and Products US, LLC: Black Rubberguard EPDM
      b. Carlisle SynTec Incorporated.
      c. Johns Manville.
      d. Versico Incorporated.
   3. Thickness: 90 mils, nominal.
   4. Exposed Face Color: Black.

2.04 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
   1. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content:
      a. Plastic Foam Adhesives: 50 g/L.
      b. Gypsum Board and Panel Adhesives: 50 g/L.
      c. Multipurpose Construction Adhesives: 70 g/L.
      d. Fiberglass Adhesives: 80 g/L.
      e. Single-Ply Roof Membrane Adhesives: 250 g/L.
      f. Single-Ply Roof Membrane Sealants: 450 g/L.
      g. Non-membrane Roof Sealants: 300 g/L.
      h. Sealant Primers for Nonporous Substrates: 250 g/L.

i. Sealant Primers for Porous Substrates: 775 g/L.
j. Other Adhesives and Sealants: 250 g/L.

B. Bonding Adhesive, splice cleaners, splice cement and splice tape: Manufacturer's standard.

C. Seaming Material: Manufacturer's standard, synthetic-rubber polymer primer and 6 inch (75mm) wide minimum, butyl splice tape with release film.

D. Lap Sealant: Manufacturer's standard, single-component sealant, colored to match membrane roofing.

E. Molded Pipe Flashings inside and outside corner flashing: as recommended by membrane manufacturer.

F. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.

G. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 inch by 1/8 inch (25mm by 3mm) thick; with anchors.

H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, molded pipe boot flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

I. Walkway Pads: Protective surfacing for roof traffic shall be non-slip textured, pressure-sensitive walkway pads (with Factory-Applied Tape on the underside of the walkway) adhered to the membrane surface in conjunction with primer. Color to match roofing.

J. Roof edge and coping system materials: Material shall be as specified herein or in Section(s) 077100 - Roof Specialties - Copings and 077100.13 - Roof Specialties - Flashing; Coping Covers, Scuppers, Flashings and Roof edge systems shall be included in the Roofing manufacturer's Thirty (30) year Total System NDL Warranty. Kynar finish for all metal components shall be as selected by Architect. Provide complete system with concealed cover plate, extenders, Factory-fabricated corners, end caps and fasteners.

2.05 SUBSTRATE BOARDS / THERMAL BARRIER

A. Substrate Board / Thermal Barrier: ASTM C1177/C1177M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, 5/8 inch (16 mm) thick.
1. Products: Subject to compliance with requirements, provide the following:
a. Georgia-Pacific; DensDeck Prime Roof Board.
b. USG Corporation; Securock Gypsum-Fiber Roof Board.
c. Architect approved equivalent.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM 4470, designed for fastening substrate panel to roof deck.

2.06 VAPOR RETARDER

A. Self-Adhering-Sheet Vapor Retarder: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.

2.07 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by EPDM roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated. Minimum LTTR of 30 required.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 3, felt or glass-fiber mat facer on both major surfaces.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
a. Elevate; Holcim Solutions and Products US, LLC; Tapered ISO 95+ TM GL Insulation.
b. Carlisle Syntec Systems: InsulBase Polyisocyanurate insulation.

c. Johns Manville: ENRGY 3, 25 psi
d. Or approved equal.

C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated or at least twice the slope of the tapered insulation in the field of the roof areas.

2.08 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

C. Flexible FAST Adhesive: Sure-Seal FAST 100 or 100 LV Adhesive: A low rise two-component spray-applied or extruded bead applied, to approved insulations to compatible substrates (concrete, cellular lightweight insulating concrete, gypsum, cementitious wood fiber, wood or steel) or sooth or gravel surfaced BUR, modified bitumen or cap sheets.

D. Cover Board: Cellulosic-fiber reinforced, water-resistant gypsum substrate, 5/8 inch (16 mm) thick.
1. Products: Subject to compliance with requirements, provide the following:
a. Georgia-Pacific; DensDeck Prime Roof Board.ASTM C1177/C1177M
b. USG Corporation; Securock Gypsum-Fiber Roof Board.ASTM C1278/C1278M
c. Securshield HD Plus Coverboard, ASTM C1289.
d. ProtectoR HD Polyiso Cover Board, ASTM C1289

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that perimeter wood blocking, curbs, and nailers are securely anchored to roof deck at roof perimeters, penetrations and terminations in accordance with Factory Mutual 1-49 requirements and that nailers match thicknesses of insulation .
3. Steel Decks: Verify that surface plane flatness and fastening of steel roof deck complies with manufacturer's requirements.
4. Concrete Decks:
a. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
b. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
c. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.03 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.04 SUBSTRATE BOARD / THERMAL BARRIER INSTALLATION

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
   1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.05 VAPOR-RETARDER INSTALLATION

A. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 inches and 6 inches, respectively. Seal laps by rolling.

B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.06 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated. Form crickets and saddles as indicated on approved roof installation shop drawings.

D. Install insulation under area of roofing to achieve required LTTR of 30 minimum. Install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

G. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

H. Mechanically Fastened Insulation: Install insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

I. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

J. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
   1. Fasten cover boards according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
   2. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.07 ADHERED MEMBRANE ROOFING INSTALLATION

A. Adhere roofing over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.

B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

E. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeters.

F. Apply roofing with side laps shingled with slope of roof deck where possible.

G. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing terminations.

H. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

I. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal membrane roofing in place with clamping ring.

J. Adhere protection sheet over membrane roofing at locations indicated.

3.08 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.09 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.

B. Manufacturer's Field Services: The manufacturer's authorized Field Representative and Roofing Quality Control Inspector shall provide the following:
   1. Attend and conduct Pre-installation Meeting.
   2. Perform preparatory, initial, follow-up and final inspections for roof insulation and roofing system.
   3. Prepare and submit inspection reports for each inspection made.

C. Upon completion of the installation the manufacturer's authorized Field Representative shall conduct an on-site inspection in the presence of the Architect/Engineer to insure that the installation has been installed in accordance with the manufacturer’s specifications.

D. Flood Testing: Flood test each roofing area for leaks, according to recommendations in ASTM D 5957, after completing roofing and flashing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
   1. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of base flashing.
   2. Flood each area for 24 hours.
   3. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.

E. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

F. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

G. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.10 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition

free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Provide through penetration firestopping. The work of this section shall include, but not be limited to, the following:
   1. Provide firestopping at all openings in floors and fire rated walls and partitions to prevent the passage of fire, smoke or toxic gases and to maintain required fire ratings.
   2. Provide firestopping at all electrical, plumbing and electrical duct and pipe penetrations in floors, and fire-rated walls and partitions, to prevent the passage of fire, smoke or toxic gases.

1.02 QUALITY ASSURANCE

A. Qualifications: The work of this section shall be performed by a qualified and experienced installer, acceptable to the Architect/Engineer. The term "installer", as used herein shall mean a firm of established reputation; which has been trained by the manufacturer in the proper installation of fire safing material and which is regularly engaged in, and maintains a regular force of workers skilled in the installation of fire safing material of the type specified.

1.03 REFERENCES

A. Codes and Regulations: Comply with applicable regulations of governmental authorities having jurisdiction.

B. ASTM E119, Method for Fire Tests of Building Construction and Materials.

C. ASTM E814, Fire Tests of Through Penetration.

D. U.L. 1479, Standards for Fire Tests of Through Penetration Firestops.

E. Factory Mutual Systems.

1.04 SUBMITTALS

A. Shop Drawings: Shop drawings shall indicate the locations and types of the various fire safing material to be used throughout the building, and material and methods of installation of damming for the various floor, wall and ceiling construction. Details of damming shall be large scale and shall indicate material and methods of installation.

B. Product Data: Submit manufacturer's technical data and installation instructions.

C. Test Reports: Submit copies of test reports, by an independent testing laboratory, indicating that the fire safing material complies with the specified requirements.

1.05 FIELD QUALITY CONTROL

A. Section 014523 - Quality Control: field inspection and testing.

B. Tests for thickness and density of applied material will be performed by an independent testing agency. Where test results are unsatisfactory in sample areas, additional tests in other areas may be made. Such further testing, if required, shall be by the same testing agency but shall be paid for by the installer.

C. Independent Testing Agency will:
   1. Inspect the installed firestopping after application and curing for integrity, prior to its concealment.
   2. Ensure that actual thicknesses, densities, and bond strengths meet requirements for specified ratings.
   3. Re-inspect the installed firestopping for integrity of fire protection, after installation of subsequent work.
   4. Provide written certification to the Architect, indicating installation meets or exceeds requirements of contract documents.

1.06 WARRANTY

A. Provide standard manufacturer's warranty on material composition and resistance to breakdown.

PART 2 - PRODUCTS

2.01 FIRE RESISTANT SILICONE FOAM

A. Acceptable materials are DOW CORNING Silicone RTV Foam, Chase-Foam CTCPR-855 by CHASE TECHNOLOGY CORP., Pensil RTV 851 by GENERAL ELECTRIC, or approved equal.

B. Foam sealant shall conform to the required fire rating in accordance with the requirements of ASTM E119, with a flamespread rating of 15 in accordance with ASTM E84. Foam sealant shall also conform to UL Standard 1479: "Standards for Fire Tests of Through Penetration Firestops".

C. The foam sealant shall provide a fire resistance equal to the construction into which it is installed; in accordance with "Through Penetration Firestop Systems (XHEZ)" in the Underwriters Laboratories "Building Materials Directory".

D. Dams: Provide dams as recommended by the manufacturer, as required for proper installation and for required fire rating.

2.02 MINERAL FIBER FIRE SAFING INSULATION

A. Provide insulation as manufactured by USG INTERIORS, INC. Product "Thermafiber Safing", CAFCO INDUSTRIES LTD., FIBREX INC. or approved equal. Density shall be 4 pcf with thickness to suit condition.

B. Provide 20 gauge minimum metal plate where required for fire safing support to comply with fire ratings.

C. Do not use fibrous safing insulation unless it is in conjunction with a compatible smoke seal as specified herein.

2.03 MINERAL WOOL

A. Loose mineral wool, rated noncombustible when tested according to ASTM E136, free of asbestos and glass fiber, and suitable for stuffing into metal deck flutes to an in place density of 6 to 12 pcf.

2.04 FIRESTOPPING SEALANT

A. Provide a silicone firestop sealant classified for both flame and temperature ratings under ASTM E814.

B. Acceptable materials are USG INTERIORS "Smoke Seal Compound", DOW CORNING "Firestop Sealant", BIO FIRESHIELD "Biotherm", 3M "Fire-Barrier Caulk", GENERAL ELECTRIC "RTV 7403" or approved equal.

2.05 FIRESTOPPING MORTAR

A. Provide Portland cement/fly ash mortar with an air dried density of 50 to 55 pounds per cu.ft. Mortar shall be classified for both flame and temperature ratings under ASTM E814.

B. Acceptable materials are BIO FIRESHIELD "Novasit K-10" or approved equal.

2.06 PREFORMED PIPE SEALS

A. Provide preformed intumescent collars classified for both flame and temperature under ASTM E814.

B. Acceptable materials are BIO FIRESHIELD "Firestop Collars", 3M "Wrap/Strip FS 195" or approved equal.

2.07 ACCESSORIES

A. Provide anchorage assemblies complying with U.L. designs and other components and accessories as needed.

PART 3 - EXECUTION

3.01 DELIVERY AND STORAGE

A. Deliver material and products in unopened packages and containers, clearly indicating name of manufacturer and U.L. labeling. Store and handle in strict compliance with manufacturer's

instructions and recommendations. Protect from damage. Protect material from freezing or overheating in accordance with manufacturer's instructions.

3.02 INSPECTION

A. Examine all surfaces to which the firestopping materials are to be applied, and notify the Architect/Engineer in writing of any conditions detrimental to the proper and expeditious installation of the work. Starting of work within an area shall be construed as acceptance of the conditions of that area.

B. Thoroughly clean all surfaces to receive firestopping material to eliminate mill scale, dirt, grime, oil, grease, dust, loose rust or paint, and all other foreign material.

C. Cleaning shall be accomplished just prior to application of firestopping material.

3.03 INSTALLATION (GENERAL)

A. Material and equipment shall be as approved by the manufacturer. Application procedures shall be in strict accordance with the manufacturer's directions and specifications. Only experienced, skilled mechanics approved by the material manufacturer shall be allowed to place the material.

B. Provide firestopping material at thicknesses as required to provide indicated ratings. Where not otherwise indicated, comply with U.L. standard designs. In multiple layer work, offset joints by at least 6 inches.

C. Anchor firestopping using manufacturer's recommended system and in compliance with U.L. standard designs.

D. Install firestopping without gaps and voids of any kind. Do not use damaged materials. Remove and replace nonfitting or disturbed work.

3.04 MINERAL SAFING INSULATION

A. Use mineral safing insulation at top of fire-rated partitions at underside of metal deck to provide complete fire-rated seal.

B. Mineral safing insulation must be used in conjunction with a sealant or foam firestop to ensure a continuous smoke seal.

3.05 FIRESTOPPING SEALANT

A. Use firestopping sealant at narrow joints at fire-rated floor and wall penetrations, and at penetrations subject to vibration or movement. Typical penetrations requiring sealant are plumbing and HVAC piping, electric conduit and ductwork.

B. Where openings are large enough, use mineral safing insulation in thicknesses required to dam the joint, and apply 1/2 inch minimum depth of sealant, or as required to achieve the rated assembly.

3.06 FOAM-IN-PLACE FIRESTOPPING

A. Apply foam-in-place firestopping material in depths required to meet the fire ratings indicated or required by U.L. standards. Provide clips or other approved means to contain the foam-in-place material which will enable the foam to solidly fill the areas intended. Mixing and application shall be in strict accordance with the manufacturer's written instructions.

B. Foam firestopping may be used in lieu of sealant or mortar material at the Contractor's option, provided details conform to manufacturer's recommendations for maintaining the integrity of the assembly in question.

3.07 FIRESTOPPING MORTAR

A. Mortar may be used to firestop all large, nonmoving openings in fire-rated assemblies, including multiple openings in floor slabs.

B. Mix mortar with clean water in accordance with the manufacturer's printed instructions. Wet all surfaces with water prior to application of mortar. Apply by hand or pump and vibrate in penetrations to prevent voids from forming.

C. Do not apply mortar if ambient or substrate temperature is below 35°F during the 24 hour period before application.

3.08 PREFORMED PIPE SEALS

A. Use preformed pipe seals for firestopping nonmetallic pipes or conduit penetrating rated assemblies. Preformed collars may be surface mounted or embedded in firestop mortar as space permits to seal PVC or ABS pipe penetrations. Size selection and installation shall be in strict accordance with manufacturer's written instructions.

3.09 FIELD QUALITY CONTROL

A. Coordinate installation of firestopping work with other work to minimize cutting and removal of installed firestopping. As work of other trades is completed, review firestopping work and repair or replace work which has been damaged or removed. Inspections will be performed to verify compliance with requirements.

3.10 CLEANING AND PROTECTION

A. Upon completion of the work, remove all unused materials from the site. Clean floors, walls and other adjacent surfaces that are stained, marred or otherwise damaged by this work. Leave all work and the adjacent areas in a clean condition.

B. Protect all completed work from damage, by methods recommended by the manufacturer of installed material.

3.11 SYSTEMS AND APPLICATION SCHEDULE

A.	CONSTRUCTION CONDITION	UL DESIGNATION
B.	Metal Pipe or Conduit	220, 221, 223
	1. Through Round Opening	316, 400, 425
C.	Insulated Metal Pipe	301, 310, 402, 403
	1. Through Round Opening	
D.	Metal Pipes or Conduits	399
	1. Through Large Openings	
E.	Cables Through Opening	222, 224, 307, 425
F.	Nonmetallic (Plastic) Pipe	300
	1. or Conduit through Opening	
G.	Metal Pipe or Conduit	425
	1. Through Gypsum Board Wall	
H.	Nonmetallic (Plastic) Pipe	226, 227, 228, 312
	1. or Conduit Through Gypsum	
	2. Board Wall	
I.	Cables Through Gypsum	425
	1. Board Wall	
J.	Mixed Penetrating Items	218, 219
K.	1. Ductwork Insulated	301
	1. Through Gypsum Board Wall in	227, 313
	2. Sleeve Opening	
L.	1. Ductwork	218, 219
	1. 2 Hr Gypsum Wall	312

M. Provide additional UL designation as required to achieve firestopping ratings equal to or greater than assembly penetration.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Silicone joint sealants.
   2. Polyurethane joint sealants.
   3. Latex joint sealants.
   4. Preformed joint sealants.
   5. Acoustical joint sealants.

1.03 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
   1. Use ASTM C1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
   2. Samples for Verification: For each type of sealant submit a color sample board and one sample joint, 1/2 inch wide by 6 inches long including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
   3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
   4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
   5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.04 ACTION SUBMITTALS

A. See Section 013300 - SUBMITTALS, for Submittal Procedures.

B. Product Data: For each joint-sealant product indicated.

C. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

D. Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.
   3. Joint-sealant formulation.
   4. Joint-sealant color.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer and testing agency.

B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

D. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
   1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

E. Warranties: Sample of special warranties.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project with a minimum of three (3) years experience in the installation of the work of this section.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.
   1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.
   2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.07 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 degrees F.
   2. When joint substrates are wet.
   3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.08 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Two (2) years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
   1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
   2. Disintegration of joint substrates from natural causes exceeding design specifications.
   3. Mechanical damage caused by individuals, tools, or other outside agents.
   4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   1. Architectural Sealants: 250 g/L.

2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

C. Liquid-Applied Joint Sealants: Comply with ASTM C920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.
1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

D. Stain-Test-Response Characteristics: Where sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C1248 and have not stained porous joint substrates indicated for Project.

E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full color range.

G. Sealant Abbreviations:

Use (related to application)
1. NT = Non-Traffic
2. T = Traffic

Type
1. S = Single Component
2. M = Multi-component
3. LM = Low Modulus
4. C = Clear
5. OP = Opaque

Grade
1. NS = Non-Sag
2. NF = Non-Flexible
3. P = Pourable
4. SL = Self-Leveling

Use (related to Material)
1. M = Mortar Contact
2. G = Glass Contact
3. A = Aluminum Contact
4. O = Other Materials
5. I = Immersible

2.02 SILICONE JOINT SEALANTS

A. Single-Component, Non-sag, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, for Use (application) T; Use (for materials) M and O.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
a. Dow Corning Corporation; DOWSIL 790.
b. GE Advanced Materials - Silicones; SCS2000 SilPruf LM.
c. Pecora Corporation; 301 NS
d. Sika Corporation, Construction Products Division; SikaSil-WS 290
e. Tremco Incorporated; Spectrem 1.

2.03 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    a. BASF; MasterSeal NP 520.
    b. GE Advanced Materials; Ultra Seal.
    c. Pecora Corporation; AC-20+.
    d. Tremco Incorporated; Tremflex 834.
    e. Sherwin Williams Company (SherMax Urethanized Elastomeric Sealant).

2.04 PREFORMED JOINT SEALANTS

A. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from Polyurethane foam with minimum density of 10 lb/cu. ft. (160 kg/cu. m) and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.
    1. Products: Subject to compliance with requirements, provide the following:
        a. Tremco Incorporated; Spectrum SimpleSeal.
        b. Tremco Incorporated; Illmod 600
        c. Emseal Joint Systems, Ltd.; 25V.
        d. Schul International Company; Sealtite Standard.

2.05 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard non-sag, fire resistant, paintable, non-staining acrylic latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
    1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
        a. Pecora Corporation; AC-20 FTR.
        b. Sherwin-Williams Company, Sher-Max Urethanized Elastomeric Sealant
        c. Tremco Incorporated; Tremflex 834, Acoustical/Curtain Wall Sealant
        d. USG Corporation; SHEETROCK Acoustical Sealant.

2.06 BUTYL SEALANTS

A. Butyl Sealant: Manufacturer's non-skinning, non-hardening, non-bleeding permanently flexible gun grade compound to limit sound transmission, seal painted and aluminized metal panels and to act as a vapor barrier for polyethylene barrier films complying with ASTM C919, Use (application) NT; Use (for materials) M, G, A, and O.
    1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
        a. Pecora Corporation; BA-98.
        b. DOWSIL 335 Butyl Sealant

B. Butyl Sealant: Manufacturer's one-part gun grade compound formulated from virgin butyl rubber for use as a sealing and glazing compound complying with ASTM C1311, Type S, for Use (application) NT; Use (for materials) M, G, A, and O.
    1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
        a. Pecora Corporation; BC-158.
        b. Tremco; Tremco Butyl Sealant

2.07 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in

writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.08 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Non-staining, non-absorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    a. Metal.
    b. Glass.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Provide concave joint profile per Figure 8A in ASTM C1193, unless otherwise indicated.
   4. Provide flush joint profile where indicated per Figure 8B in ASTM C1193.
   5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C1193.
      a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations and at perimeters of acoustical Panel edge channels of Acoustical Panel Ceiling systems. with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written recommendations.

3.04 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
   1. Extent of Testing: Test completed and cured sealant joints as follows:
      a. Perform 1 test for each 500 feet of joint length thereafter or 1 test per each floor per elevation.
   2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
      a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
   3. Inspect tested joints and report on the following:
      a. Whether sealants filled joint cavities and are free of voids.
      b. Whether sealant dimensions and configurations comply with specified requirements.

c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.05 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.06 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.07 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
   1. Sealant Types:
      a. Silicone Joint Sealant: Single component, non-sag, traffic grade, neutral curing.
      b. Polyurethane Joint Sealant: Single component, pourable, traffic grade.
      c. Preformed Joint Sealant: Preformed foam sealant.
   2. Joint-Sealant Colors: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal non-traffic surfaces.
   1. Joint Locations:
      a. Joints between metal panels.
      b. Joints between different materials listed above.
      c. Perimeter joints between materials listed above and frames of doors windows and louvers.
      d. Control and expansion joints in ceilings and other overhead surfaces.
   2. Sealant Types:
      a. Silicone Joint Sealant: Single component, non-sag, neutral curing, Class 100/50.
      b. Polyurethane Joint Sealant: Single component, non-sag, Class 100/50.
   3. Joint-Sealant Colors: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal non-traffic surfaces.
   1. Joint Locations:
      a. Perimeter joints of exterior openings where indicated.
      b. Tile control and expansion joints.
      c. Vertical joints on exposed surfaces of walls and partitions.
      d. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.
   2. Sealant Type:

a. Latex Acrylic based Joint Sealant.

3. Joint-Sealant Colors: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal non-traffic surfaces.
   1. Joint Sealant Location:
      a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
      b. Tile control and expansion joints where indicated.
   2. Sealant Type:
      a. Silicone Joint Sealant: Mildew resistant, single component, non-sag, neutral curing.
   3. Joint-Sealant Colors: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal non-traffic surfaces.
   1. Joint Location:
      a. Acoustical joints where indicated.
      b. Other joints as indicated.
   2. Joint Sealant: Acoustical joint sealant.

3.08 SEALANT INSTALLATION LOG

A. A tabular log of all sealant installations on the project shall be be keep and submitted with the O & M manuals at the completion of the project.

B. Tabular log shall have columns for:
   1. Sealant type
   2. Sealant installation location
   3. Temperature during installation
   4. Date of Installation
   5. Manufacturer
   6. Sealant color installed.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire-rated hollow metal frames for non-hollow metal doors.

B. Interior glazed borrowed lite and transom frames.

1.02 RELATED REQUIREMENTS

A. Section ____: Masonry grout fill of hollow metal frames.

B. Section 081111: Wood Doors

C. Section 087100 - Door Hardware: Hardware, silencers, and weatherstripping.

D. Section 088000 - Glazing: Glazed borrowed lites.

E. Section 099123 - Interior Painting: Field painting.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2019.

C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2018.

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.

E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025.

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021a.

H. 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; 2018a.

I. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

J. ASTM C476 - Standard Specification for Grout for Masonry; 2020.

K. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2016.

L. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

M. ITS (DIR) - Directory of Listed Products; Current Edition.

N. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

O. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

P. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2017.

Q. NFPA 80 -Standard for Fire Doors and Other Opening Protectives; 2013

R. UL (DIR) - Online Certifications Directory; Current Edition.

S. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; 2009

1.04 SUBMITTALS

A. See Section 013300 - SUBMITTALS 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 grade standard.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store in accordance with applicable requirements and in compliance with standards and/or custom guidelines as indicated.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Frames with Integral Casings:
   1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
   2. Republic Doors: www.republicdoor.com.
   3. Steelcraft, an Allegion brand: www.allegion.com/sle.
   4. Or approved equal.

2.02 PERFORMANCE REQUIREMENTS

A. Refer to Door and Frame Schedule on the drawings for frame sizes, fire ratings, sound ratings, finishing, door hardware to be installed, and other variations, if any.

B. Door Frame Type: Provide hollow metal door frames with integral casings.

C. Steel used for fabrication of frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.

D. Accessibility: Comply with ICC A117.1 and ADA Standards.

E. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Flush.

F. 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 frame that is also indicated as being sound-rated must comply with the requirements specified for exterior frames and for sound-rated frames; where two requirements conflict, comply with the most stringent.

G. Hardware Preparations, Selections and Locations: Comply with BHMA A156.115, NAAMM HMMA 830 and NAAMM HMMA 831 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

H. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

I. Mullions for Pairs of Doors: Fixed, except where removable is indicated, with profile similar to jambs.

J. Frames for Interior Glazing or Borrowed Lites: Construction and face dimensions to match door frames, and as indicated on drawings.

K. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inch high (102 mm) to fill opening without cutting masonry units.

2.03 HOLLOW METAL DOOR FRAMES WITH INTEGRAL CASINGS

A. Frame Finish: Factory primed and field finished.

B. Fire-Rated Door Frames:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 3 - Extra Heavy-duty.
      b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Frame Metal Thickness: 16 gauge, 0.053 inch (1.3 mm), minimum.
   2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with {\rs\#2} or AA DAF-45 ("positive pressure fire tests").
   3. Provide units listed and labeled by ITS (DIR) or UL (DIR).
      a. Attach fire rating label to each fire rated unit.

2.04 ACCESSORIES

A. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

B. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches (102 mm) as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

C. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

2.05 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

B. Factory Finish: Complying with ANSI/SDI A250.3, manufacturer's standard coating.
   1. Color: To be selected by Architect/Engineer from manufacturer's standard range.

C. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.01 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.

3.02 PREPARATION

A. Coat inside of frames with bituminous coating to a thickness of 1/16 inch.

3.03 INSTALLATION

A. Install frames in accordance with manufacturer's instructions and related requirements of specified 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. Coordinate installation of glazing.

E. Coordinate installation of hardware.

F. Coordinate installation of electrical connections to electrical hardware items.

3.04 TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edges, crossed corner to corner.

3.05 SCHEDULE - SEE DRAWINGS

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section including the following.
   1. Flush steel door jamb systems of the following types:
      a. Single rabbet door frames. (EzyJamb Single Rabbet - SRC)
      b. In-swing door frames. (EzyJamb Inswing - ISD)

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions for each product specified.

B. Shop Drawings: Submit shop drawings showing details of each opening, including elevations, frame profiles, accessories and attachment.

C. Schedule: Submit a door frame schedule indicating number and location of each frame, matching door numbering on the Drawings.

D. Sustainable Design: Submit manufacturer's documentation indicating percentage of recycled steel in frames.

1.03 QUALITY ASSURANCE

A. Manufacturing: Product manufactured under both ISO9001 and ISO14001 - 2015 EMS policy.

B. Source Limitations: Obtain metal frames through one source from a single manufacturer.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

B. Storage and Handling: Comply with manufacturer's recommendations for storage and handling. Protect from weather damage.

1.05 WARRANTY

A. Warranty: Provide manufacturer's standard limited warranty against defects in manufacturing.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Basis-of-Design Manufacturer: EzyJamb, 1700 Boulter Industrial Pkwy, Webster, NY 14850. Toll Free: 888- 399-5262. Fax: 585-545-3010. Web: www.ezyjamb.com.

B. Architect approved equivalent.

2.02 TRIMLESS INTERIOR DOOR FRAMES

A. Single Rabbet Door Frames: EzyJamb Single Rabbet - SRC complying with the following.
   1. Material: 18 gauge galvannealed steel, one-piece with perforated flanges.
   2. Depth: Suitable for 1 3/4 inch thick doors and applicable partition thicknesses indicated on the drawings.
   3. Fire Rating for 1-3/4 Inch Thick Doors (Intertek listed): 45, 60, and 90 minutes as indicated on the drawings.
   4. Hardware:
      a. Invisible Door Hinges: RocYork RY80-F (Fire-Rated Doors).
      b. Door Strikes: ASA Strike 4-7/8 inches.

B. In-Swing Door Frames: EZYJamb Inswing - ISD complying with the following.
   1. Material: 18 gauge galvannealed steel, one-piece with perforated flanges.
   2. Depth: Suitable for 2-1/4 inch thick doors, and applicable partition thickness.

3. Fire Rating: Not applicable.
4. Hardware:
    a. Invisible Door Hinges: Rocyork RY-180
    b. Mortised Door Hinges: Rocyork 4-1/2 by 4-1/2 by 0.134 inch .
    c. Door Strikes: ASA Strike 4-7/8 inches.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates for compliance with requirements for installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install trimless door frames in accordance with manufacturer's instructions and approved submittals including the following:
    1. Install frames plumb and square.
    2. Use door as a template when available to ensure proper alignment and clearances.
    3. Install frames securely using fasteners suitable for substrate.
    4. Leave frames ready for taping and application of drywall compound.
    5. Repair frames damaged during installation.
    6. Replace frames which cannot be successfully repaired.

B. Install accessory products in accordance with manufacturer's instructions and approved submittals including the following:
    1. Install products plumb and square.
    2. Install products in proper relationship to adjacent construction.
    3. Repair products damaged during installation.
    4. Replace products which cannot be successfully repaired.

3.03 CLEANING AND PROTECTION

A. Clean frames as recommended by manufacturer. Protect from damage until acceptance.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Solid-core doors with wood-veneer faces.
   2. Sound Control Doors (STC).
   3. Factory finishing flush wood doors.
   4. Factory fitting flush wood doors to frames and factory machining for hardware.
   5. Louvers installed in flush wood doors.
   6. Light frames and glazing installed in wood doors.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
   1. Dimensions and locations of blocking.
   2. Dimensions and locations of mortises and holes for hardware.
   3. Dimensions and locations of cutouts.
   4. Undercuts.
   5. Requirements for veneer matching.
   6. Doors to be factory finished and finish requirements.
   7. Fire-protection ratings for fire-rated doors.

C. Samples for Verification:
   1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.
   2. Louver blade and frame sections, 6 inches long, for each material and finish specified.
   3. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.04 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body and is a certified participant in AWI's Quality Certification Program.

B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

C. Fire Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40” above sill) or UL 10C.
   1. Oversize Fire Rated Door Assemblies: For units exceeding sizes of tested assemblies provide manufacturer’s construction label, indicating compliance to independent 3rd party certification agency’s procedure, except for size.
   2. Temperature Rise Limit: Where required and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire test exposure.

D. Smoke Control Door Assemblies: Comply with NFPA 105.

1. Smoke "S" Label: Doors to bear “S” label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.07 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during remainder of construction period.

1.08 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Warping (bow, cup, or twist) more than 1/4 inch in a 42 by 84-inch section.
      b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3 inch span.
   2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
   3. Warranty Period for Solid-Core Interior Doors: Life of installation.
   4. Warranty Period for Hollow-Core Interior Doors: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. VT Industries, Inc.; Heritage Series
   2. Masonite Architectural.
   3. Or approved equal.

B. Source Limitations: Obtain flush wood doors indicated to be blueprint matched with paneling from single manufacturer.

2.02 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards WDMA I.S. 1A, "Architectural Wood Flush Doors."
   1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
   2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.

B. ICC A117.1 - Accessible and Usable Buildings and Facilities.

C. WDMA I.S. 1A Performance Grade: Heavy Duty and Extra Heavy Duty as specified.

D. WDMA I.S. 1A Performance Grade:
   1. Heavy Duty unless otherwise indicated.
   2. Extra Heavy Duty: public toilets, janitor's closets and assembly spaces.
   3. Standard Duty: Closets (not including janitor's closets) .

E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
   1. Temperature-Rise Limit: Where indicated, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
   2. Cores: Provide stave lumber core or mineral core as needed to provide fire-protection and positive pressure rating indicated.
   3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
   4. Electronic Barcode: “VTsmartdoor” barcode technology.
      a. Location: Fire label, hinge stile of doors.
      b. Provide fire-rated door assembly information required for Owner’s annual fire-door inspection in accordance with NFPA 820, Paragraph 5.2.1.

F. Mineral-Core Doors:
   1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
   2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
      a. 5-inch top-rail blocking (HB-1).
      b. 5-inch bottom-rail blocking, in doors indicated to have protection plates (HB-2).
      c. 5-inch midrail blocking, in doors indicated to have armor plates (HB-6).
      d. 5-inch midrail blocking, in doors indicated to have exit devices (HB-6).
   3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges (HB-7).
      a. Screw-Holding Capability: 550 lbf per WDMA TM-10.

G. STC Rated Doors:
   1. Core: Composite Sound Core comprising 70 percent of door construction weight with HDF crossbands (20 percent of door construction weight) composed of preconsumer recycled material. 1 3/4 inch finish door thickness. SCL (Structural Composite Lumber), FSC certified, vertical stiles with face matching edge veneers.
   2. STC rating: 49 minimum.
   3. Fire-rating: 20 minute- positive pressure
   4. Face and edge veneers: 'A' grade wood veneer.
      a. Apply to crossbanded core in hot press using Type I, exterior, water-resistant adhesive.
      b. Minimum Thickness Before Sanding: 1/42 inch.
   5. Perimeter Gasketing and Drop Seals: See Hardware Schedule, Section 087100.

2.03 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:
   1. Grade: Premium with Grade A faces.
   2. Species: Select White Maple.
   3. Cut: Rift Cut.
   4. Match between Veneer Leaves: Slip match.
   5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
   6. Pair and Set Match: Provide for doors hung in same opening.
   7. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
   8. Blueprint Match: Where indicated, provide doors with faces produced from same flitches as adjacent wood paneling and arranged to provide blueprint match with wood paneling. Comply with requirements in Section 064216 "Flush Wood Paneling."

9. Exposed Vertical and Top Edges: Same species as faces - edge Type A.
10. Core: Either glued wood stave lumber core or structural composite lumber.
11. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.
12. WDMA I.S. 1A Performance Grade: Extra Heavy Duty.

2.04 LIGHT FRAMES AND LOUVERS

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
   1. Wood Species: Same species Rotary cut as door faces.
   2. Profile: Flush rectangular beads.
   3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Metal Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.
   1. Anemostat Door Products; WoodPro Wood Veneer FR Metal Vision Frame with no visible fasteners, for 3/16" or 1/4" glazing, Species: White Oak, finish to match door face panels.
   2. or approved equal.

2.05 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
   1. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA A156.115W, and hardware templates.
   1. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
   1. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

D. Openings: Factory cut and trim openings through doors.
   1. Light Openings: Trim openings with moldings of material and profile indicated.
   2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 - {\t\#1000398}.
   3. Louvers: Factory install louvers in prepared openings.

2.06 FINISHES -WOOD VENEER DOORS

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
   1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Factory finish doors that are indicated to receive transparent finish.

D. Factory finish doors where indicated in schedules or on Drawings as factory finished.

E. Transparent Finish:
   1. Grade: Premium.

2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 10. UV Curable, Water Based.
3. Finish: WDMA TR-6/OP-6 (Extra Heavy-Duty) catalyzed polyurethane and TR-8, UV cured urethane (Premium Grade).
4. Staining: As selected by Architect from manufacturer's full range.
5. Sealer: minimum 3 coats.
6. Sanding: Sand.
7. Topcoat: 2 coats.
8. Effect: Semi-filled finish, produced by applying an additional finish coat to partially fill the wood pores or as selected by the architect.
9. Sheen: Semi-gloss.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.
   1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
   2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Hardware: See Section 087100 - {\t\#1000392}.

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
   1. Install fire-rated doors according to NFPA 80.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
   1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide1/4 inch from bottom of door to top of threshold unless otherwise indicated.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.03 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Agreement, including General and Supplementary Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY AND DEFINITIONS

A. This section includes the following:
   1. Furnish and install doors, frames of FRP composite construction in accordance with details and schedule shown on the Contract Drawings and as specified herein. Door and frame products of aluminum, steel or wood construction that use FRP face sheets are strictly excluded.
   2. Related Sections:
      a. Section 087100 – Door Hardware
      b. Section 088000 – Glazing

B. FRP is defined as “Fiberglass Reinforced Polyester”.

1.03 QUALITY ASSURANCE

A. Referenced Standards
   1. American Society for Testing and Materials (ASTM).
   2. Society of Automotive Engineers (SAE).
   3. International Building Code, Plastics (Chapter 26).
   4. UL Standards for Safety UL10B / UL10C, UBC 7-2.
   5. ANSI A250.4 1,000,000 cycle test.

B. Experience: Manufacturer shall be ISO 9001 certified and been engaged in the manufacture of FRP door and frame systems for a minimum of five (5) years documented experience prior to the start of this work, and who has a history of successful production acceptable to the Architect.

C. Referenced Standard: Where labeled fire doors are required, Fiberglass Doors and frames shall be UL listed and shall be tested successfully to UL10B / UL10C, UBC 7-2 standards.

D. Process: Certify that FRP doors are manufactured via press-molding technology.

E. Warranty: Provide written limited guarantee for FRP doors and frames as follows:
   1. Heavy Duty doors are guaranteed for the life of the product against delamination and failure due to corrosion from the specific chemical environment named at the time of purchase. Furthermore, all products are inspected prior to shipment and guaranteed against defective workmanship for a period of ten (10) calendar years after the date of purchase.

1.04 SUBMITTALS

A. Pursuant to Section 013300 – Submittal Procedures.

B. Pursuant to Section 016100 – Product Requirements.

C. Product Data: Provide catalog cut of FRP door detailing internal construction and reinforcements, materials used and description of molding process.

D. Shop Drawings: To include the following specific information:
   1. Specifications relating to FRP door thickness, resin type, core material, method of construction, finish color, type of glass and glazing, anchor systems, joint construction and complete warranty information.
   2. Complete schedules or drawings of FRP doors and frames (and associated Door Hardware) showing identifying mark numbers, door and frame types, typical elevations, nominal sizes, handing, actual dimensions and clearances, and required hardware preps and reinforcements.
   3. Supporting reference drawings pertaining to frame mounting details, door light or louver installation, hardware locations, and factory hardware cutouts and reinforcements.

E. Color Samples: Provide a complete set of available finish colors from the manufacturer for color selection.

F. Installation instructions: Include manufacturer's specific information describing procedures, sequence and required fasteners for frame and door installation.

G. Production of FRP doors and frames shall not proceed until final approval of submittals and all necessary manufacturing information is received from customer.

1.05 DELIVERY, STORAGE AND HANDLING

A. FRP doors and frames are to be delivered to the project in adequate crating with foam sheet separations between all components.

B. Upon receipt of shipment, remove and inspect the doors and frames for damage. Note any damage on the shipping papers prior to accepting. If there is any noted (visible or concealed) damage, notify manufacturer immediately.

C. Handling and storage of the doors and frames after receipt is the responsibility/liability of the contractor. It is recommended that the doors be stored indoors in a vertical position, clear of the floor, with blocking between the doors to permit air circulation between the doors and prevent damage to the door faces. Rain/water or condensation must not be allowed to collect or lay between stored doors. Do not wrap in plastic sheeting as it will promote condensation formation within. Permanent discoloration can result.

D. Use care in handling FRP doors and frames to prevent damage to factory finishes. Wear protective gloves and do not slide or drag doors or frames against one another.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. FRP Doors and Frames shall be as manufactured by Overly/Tiger Door, 574 West Otterman Street, Greensburg, PA 15601. Phone 800-979-7300, Fax 724-830-2871 - www.tigerdoor.com or Architect approved equivalent.

2.02 FRP DOORS

A. Heavy Duty FRP Doors

1. Design: FRP doors shall be of seamless press-molded construction. Laminated FRP face sheets shall be applied while wet and uncured to an internal door stile and rail subframe/core assembly and then press-molded under heat and pressure. The composite door panel must be integrally fused over its entire surface area, not just adhesive-bonded at perimeter stiles and rails. Doors shall remain under pressure during curing for flat, warp-free surfaces.
2. Stiles & Rails: A high-modulus pultruded FRP square or rectangular tube subframe is to be provided within the door. Tubes are to be mitered and joined internally at the corners with solid polymer blocks to yield a one-piece unit that does not require any secondary external sealing. Provide a tubular midrail across width of door at lock height, and additional horizontal rails where specific design conditions dictate. Doors shall incorporate molded-in FRP edge strips, chemically bonded to the subframe stiles, for machining of hardware mortises so as not to cut or otherwise compromise the integrity of the pultruded stiles, nor allow moisture to penetrate into the core of the door. All connections shall be chemically welded. No mechanical fasteners will be allowed. The use or inclusion of aluminum, steel, gypsum or wood into stile and rail construction is not permitted.
3. Core: For maximum rigidity and compressive strength a triangular shaped 3/8" cell phenolic resin impregnated kraft paper honeycomb core shall be used. Molding pressure and resin gel time shall be sufficient to allow for penetration of resin into the cellular structure of the core to maximize shear and peel strengths at the skin/core interface and eliminate the possibility of delamination. The honeycomb is to be completely enclosed within the stile and rail subframe. Use of foam or balsa wood is not permitted.
4. Internal Reinforcement: High-modulous pultruded tubular FRP, high-density polymer compression blocks, or plastic compression blocking at all hardware locations, and corner

locations. No wood blocking, steel or aluminum reinforcing plates, ribs or fittings shall be used. A minimum of 900 lbs. of pullout strength is required for each factory supplied hinge screw.

5. Faces: Door facings shall utilize a chemical resistant thermosetting polyester resin system with fiber reinforcing layers. Supplier shall furnish door faces as shown on the drawings and in the door elevations. Chopped strand mat layers shall be used to provide bond integrity between gel coat, laminated facings and the internal door structure. Structural reinforcement shall be in the form of a knitted multi-layer material with layers of uni-directional glass fiber oriented in both the vertical and horizontal directions for high stiffness, impact resistance and resistance to warping. Gel coat surface integrally molded to be 25/30 mils thick (wet) ultra-violet light stabilized marine grade NPG-isophthalic polyester gel coat.
6. Finish: The exposed FRP door faces shall have a 3-4 mils (wet) factory applied two-part aliphatic polyurethane fully cured coating of industrial urethane. Coating shall have a minimum hardness of H to 2H. Finish shall be a slightly textured semi-gloss to minimize the visual effects of wear and tear.
7. Astragals: All pairs of doors shall be furnished with an astragal from door manufacturer made of same pultruded FRP material as door stile, rail and edge as required. Astragal shall be located on the meeting stile edge of each inactive leaf of double door pairs. Architect shall advise active leaf of door, and astragal shall be installed to cover meeting stile gap to effect seal and security.
8. Lights: Glazing to be field installed in accordance with Specification Section 08 80 00 – Glazing. Provide pultruded FRP glazing stop material with a minimum fiberglass content of 50%. Provide glazing stops for 1” thick glass. Metal, pvc, or vinyl “Glass Kit” type lights are not acceptable for non-fire rated openings.
9. Provisions for lights and louvers shall be performed during manufacture and shall not be attempted in the field. Cutouts are to be totally enclosed by pultruded FRP stiles and rails incorporated into the door structure. Light and louver cutouts that expose core material are not acceptable.

2.03 MECHANICAL PROPERTIES AND TEST PERFORMANCE

A. Pultruded structural shapes for stiles; rails, frames, and astragals shall exhibit the following minimum longitudinal coupon properties (per ASTM):
   1. Tensile strength (D638) 30,000 psi
   2. Comprehensive strength (D695) 30,000 psi
   3. Flexural strength (D790) 30,000 psi
   4. Flexural modulus (D790) 1,600,000 psi
   5. Shear strength (D2846) 4,500 psi
   6. Impact, notched (D256) 25 ft-lb/in
   7. Barcol hardness (D2853) 50

B. Core material shall exhibit the following minimum coupon properties (per ASTM):
   1. Core material must comply with the International Building Code (IBC) chapter 26 requirements for use with a plastic skin.
   2. Shear strength, longitudinal direction (C273) 68.2 psi
   3. Shear strength, transverse direction (C273) 25.8 psi
   4. Shear modulus, longitudinal direction (C273) 6940 psi
   5. Shear modulus, transverse direction (C273) 1878 psi
   6. Shear elongation, longitudinal direction (C393 short beam) 1.79%
   7. Shear elongation, transverse direction (C393 short beam) 2.72%
   8. Maximum facing stress, longitudinal direction (C393 short beam) 735 psi
   9. Maximum facing stress, transverse direction (C393 short beam) 289 psi
   10. Maximum core shear stress, longitudinal direction (C393 short beam) 63.8 psi
   11. Maximum core shear stress, transverse direction (C393 short beam) 24.9 psi
   12. Modulus of elasticity (EI) per 1" width, longitudinal direction (C393 short beam) 4.92E+04 psi

13. Modulus of elasticity (EI) per 1" width, transverse direction (C393 short beam) 1.97E+04 psi
14. Maximum facing stress, longitudinal direction (C393 long beam) 9011 psi
15. Maximum facing stress, transverse direction (C393 long beam) 4727 psi
16. Maximum core shear stress, longitudinal direction (C393 long beam) 48.3 psi
17. Maximum core shear stress, transverse direction (C393 long beam) 23.5psi
18. Modulus of elasticity (EI) per 1" width, longitudinal direction (C393 long beam) 1.14E+05 psi
19. Modulus of elasticity (EI) per 1" width, transverse direction (C393 long beam) 7.23E+05 psi
20. Stiffness "D", longitudinal direction (C393 long beam) 379,270 psi
21. Stiffness "D", longitudinal direction (C393 long beam) 260,608 psi
22. Compressive strength (C365) 53 psi
23. Compressive modulus (C365) 2110 psi
24. Density (C271) 2.42 lb/ft3

C. Adhesive shall exhibit the following minimum coupon properties (per SAE)
   1. Tensile Strength (D882-83A modified) minimum 2000 psi
   2. 8 day 25º C at 100% humidity Cross Peel (SAE J1553) minimum 330 psi
   3. 7 day immersion in seawater Cross Peel (SAE J1553) minimum 330 psi
   4. 30 day immersion in saltwater Cross Peel (SAE J1553) minimum 330 psi
   5. 72 hour immersion in gasoline Cross Peel (SAE J1553) minimum 330 psi
   6. 72 hour immersion in 20% sulfuric acid Cross Peel (SAE J1553) minimum 300 psi

D. ANSI A250.4 1,000,000 cycle test
   1. 4’ x 8’ door (up to a full light) and frame successfully tested in excess of 1,000,000 cycles with no failure of any of the design features of the door or frame.

2.04 FASTENERS

A. All fasteners for all hardware shall be type 304 CRSS (18-8 series corrosion resistant stainless steel) with no exception. No carbon steel or aluminum components shall be used.

2.05 HARDWARE

A. Doors shall be factory prepared for continuous hinge installation. Provide 161 cylindrical lock bore, rim deadbolt, ANSI 86 mortise lock edge prep and pocket, or flush bolt cutouts as required.

B. Frames shall be factory machined and drilled for all hardware requiring mortises, with #12 x 1” long stainless steel screws pre-installed for hinge attachment.

C. Hardware shall be furnished as listed in section 087100 – Door Hardware or as so designated in appropriate section and shall be coordinated by GC and installed by experienced mechanics.

D. Supplier shall furnish manufacturer’s standard templates, installation instructions, or full size approved door and frame preparation instructions as approved by the architect and as required by door and frame manufacturer prior to door and frame factory initiated manufacture.

PART 3 - EXECUTION

3.01 IDENTIFICATION

A. Factory mark all doors and frames using a chemical resistant plastic tag or indelible marker with identifying number, keyed to shop drawings, prior to shipment.

3.02 INSTALLATION

A. Frames: Install in strict accordance with manufacturer’s printed instructions. Set plumb and square, using shims for bolt-in of existing openings, or wood bracing prior to grouting of jambs. Use at least two 2x6 wood spreaders inside frame to maintain critical opening dimensions during grouting.

B. Doors: Hang per manufacturer’s printed instructions using special screws provided for hinge attachment. Install doors to swing freely and to stand open at any angle. After installation make final adjustments to hardware to allow for proper door operation and latching. All surface applied hardware shall be thru bolted.

3.03 CLEANING AND ADJUSTMENT

A. Clean exposed surfaces of FRP doors and frames with a mild, non-abrasive cleaner and water.

B. Final Adjustments: Check and readjust operating hardware items, leaving FRP doors and frames undamaged and in complete proper operating condition.

3.04 PROTECTION OF INSTALLED PRODUCT

A. Protect door opening assemblies and door hardware from damage by subsequent construction activities until substantial completion.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Exterior storefront framing.

1.03 DEFINITIONS

A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.04 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
   1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
   2. Dimensional tolerances of building frame and other adjacent construction.
   3. Failure includes the following:
      a. Deflection exceeding specified limits.
      b. Thermal stresses transferring to building structure.
      c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
      d. Noise or vibration created by wind and by thermal and structural movements.
      e. Loosening or weakening of fasteners, attachments, and other components.
      f. Sealant failure.
      g. Failure of operating units.

B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Loads:
   1. Wind Loads:
      a. Basic Wind Speed: 130 mph.
      b. Importance Factor: II
      c. Exposure Category: D

D. Deflection of Framing Members:
   1. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller.

E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E330/E330M as follows:
   1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
   3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

F. Windborne-Debris-Impact-Resistance Performance: Provide aluminum-framed systems that pass missile-impact and cyclic-pressure tests when tested according to ASTM E1886 and testing information in ASTM E1996.

1. Large-Missile Impact: For aluminum-framed systems located within 30 feet of grade.
2. Small-Missile Impact: For aluminum-framed systems located more than 30 feet above grade.
3. Test Performance: Meet criteria for passing, based on building occupancy type, when tested according to AAMA 501.4 at design displacement and 1.5 times design displacement.

G. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft. A pair of 6'-0" x 7-'0" entrance doors and frame shall not exceed 1.0 cfm per square foot. A single 3'-0" x 7'-0" entrance door and frame shall not exceed 1.0 cfm/ft2.

H. Blast Mitigation Performance: Shall be tested or proven through analysis to meet ASTM F1642, GSA TS01, and UFC 4-010-01 performance criteria.
1. To meet UFC 4-010-01, B-3.3 Standard 12 for exterior doors and Standard 10 for glazing and frame bite provisions, the following options are available:
   a. Section B-3.1.1: Dynamic analysis
   b. Section B-3.1.2: Testing
   c. Section B-3.1.3: ASTM F2248 Design Approach

I. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft.

J. Water Penetration under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
1. Maximum Water Leakage: No uncontrolled water penetrating aluminum-framed systems or water appearing on systems normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.

K. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. 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.
2. 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.
   a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
   b. Low Exterior Ambient-Air Temperature: 0 deg F.
3. Interior Ambient-Air Temperature: 75 deg F.

L. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 77 frame and 71 glass (Low E) when tested according to AAMA 1503.

M. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having a system U-factor of not more than 0.38 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

N. Sound Transmission: Provide aluminum-framed systems with fixed glazing and framing areas having the following sound-transmission characteristics:
1. Sound Transmission Class (STC): Minimum 36 STC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E413.
2. Outdoor-Indoor Transmission Class (OITC): Minimum 30 OITC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E1332.

O. Material Ingredient Reporting: Shall have a complete list of chemical ingredients to at least 100ppm (0.01%) that covers 100% of the product, acceptable documentation includes:
   1. Manufacturer's inventory with Chemical Abstract Service Registration Number (CASRN or CAS#).
      a. Kawneer's Material Transparency Summary (MTS).
   2. Cradle to Cradle certification: Either document below is acceptable for this option.
      a. Cradle to Cradle Certified™ with Material Health section Silver or above.
      b. Silver level or above Material Health Certificate.
   3. Red List Free DECLARE label.
   4. Environmental Product Declaration (EPD): Shall have a Type III Product-Specific EPD created from a Product Category Rule.

1.05 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Testing Agency Qualifications: Qualified according to ASTM E699 for testing indicated.

C. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
   1. Shop Drawings: Drawings showing layout, dimensions, identification of components, and interface with adjacent construction.
      a. Include field measurements of openings.
      b. Include elevations showing:
         1) Appearance of Aluminum-framed system layouts.
         2) Locations and identification of manufacturer-supplied door hardware and fittings.
         3) Locations and sizes of cut-outs and drilled holes for other door hardware.
      c. Include details of:
         1) Requirements for support and bracing at openings.
         2) Installation details.
         3) Appearance of manufacturer-supplied door hardware and fittings.
      d. Schedule: Listing of each type component in Aluminum-framed system assemblies, cross-referenced to shop drawing plans, elevations, and details.

D. Product Options: Information on Drawings and in Specifications establishes requirements for systems aesthetic effects and performance characteristics. 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. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
   1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

E. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines ICC A117.1.

F. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

G. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.08 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.
      c. Water leakage through fixed glazing and framing areas.
      d. Failure of operating components.
   2. Warranty Period: Five Years (Class I Anodized) from date of Substantial Completion.

B. Special Finish Warranty AAMA 2605 : Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
   1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Kawneer North America: Trifab Versaglaze 601UT Thermal Framing System (Basis of Design)
      a. System Dimensions: 2 inches x 6 inches (601UT).
      b. Glass: Center Plane
   2. EFCO Corporation.

2.02 MATERIALS

A. Aluminum: 6063-T6 Alloy and temper recommended by manufacturer for type of use and finish indicated.
   1. Sheet and Plate: ASTM B209.
   2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
   3. Extruded Structural Pipe and Tubes: ASTM B429/B429M.
   4. Structural Profiles: ASTM B308/B308M.
   5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
   1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
   2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
   3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

C. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

D. Recycled Content:
   1. Shall have a minimum of 50% mixed pre- and post-consumer recycled content.
   2. Indicate recycled content, including the percentage of pre- and post-consumer recycled content per unit of product.

3. Indicate the relative dollar value of recycled content product to the total dollar value of product included in the project.
4. Indicate the location for recovery of recycled content.
5. Indicate the location of the manufacturing facility.

E. Red List Free:
1. All parts and materials comply with the Living Building Challenge/DECLARE Red List and the Cradle-to-Cradle (C2C) Banned List:
   a. PVC-free
   b. Neoprene-free
2. Product does not contain PVC or Neoprene.

2.03 FRAMING SYSTEMS

A. Aluminum Extrusions: ASTM B221, 6063-T6 alloy and temper or as recommended by aluminum-framed door and storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" wall thickness at any location for the main frame and door leaf members.
1. Construction: Thermally broken.
   a. Kawneer IsoLock® Thermal Break with dual nominal 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
   b. Thermal break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Multipane.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Where exposed, fasteners and accessories shall be stainless steel.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, non-bleeding flashing compatible with adjacent materials.

F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.
1. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.04 GLAZING SYSTEMS

A. Glazing: As specified in Section 088000 - {\t\#1000679}

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal, Extruded EPDM rubber.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape:
1. Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:

1. Weatherseal Sealant: ASTM C920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
2. Structural Sealant: ASTM C1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
    a. Color: Black matching structural sealant.

2.05 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 079200 - JOINT SEALANTS.

B. Adjustable Aluminum Mullion/Partition Closures: MULLION MATE – SERIES 40 PLUS extruded aluminum partition closure shall be manufactured by Gordon Interior Specialties Division, Gordon, Inc., 5023 Hazel Jones Road, Bossier City, LA 71111, (800) 747-8954, Fax (800) 877-8746, sales@gordoninteriors.com or approved equal.
    1. Aluminum extrusions: 6063-T5 temper, tensile strength 31 KSI, ASTM B221.
        a. Size(s): Mullion Mate 3: 2 7/8 inch through 3 15/16 inch or as required by the field conditions.
        b. Length: 10 foot or as required by field conditions.
        c. Finish: Acrylic-Polyester hybrid powder-coat paint finish in color as selected by the Architect from the manufacturer's full color offering.

2.06 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Framing Members, General: 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 with ends coped or mitered. Make joints hairline in appearance
    3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
    4. Physical and thermal isolation of glazing from framing members.
    5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
    6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
    7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
    8. Prepare components with internal reinforcement for door hardware.

C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

D. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
    1. At exterior doors, provide compression weather stripping at fixed stops.

E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.07 ALUMINUM FINISHES

A. Finish designations that are prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:
    1. Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating. Color:_As selected by the Architect from the manufacturer's full color offering.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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 installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

3.03 INSTALLATION

A. General:
   1. Install curtain wall systems plumb, level, and true to line, without warp or rack of frames, within manufacturer’s prescribed tolerances, and complying with installation instructions.
   2. Provide support and anchor in place.
   3. Do not install damaged components.
   4. Fit joints to produce hairline joints free of burrs and distortion.
   5. Rigidly secure non-movement joints.
   6. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
   7. Seal joints watertight unless otherwise indicated.

B. Glazing:
   1. Glass shall be outside-glazed.
   2. Glass shall be held in place with extruded aluminum pressure plates anchored to the mullion using stainless steel fasteners that are spaced no more than 9" (228.6 mm) on center.
   3. Install glazing as specified in Section 088000 - {\t\#1000398}.
   4. References: ANSI Z97.1, CPSC 16 CFR 1201, and GANA Glazing Manual.

C. Metal Protection:
   1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing non-conductive spacers as recommended by manufacturer for this purpose.
   2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

D. Water Drainage
   1. Each light of glass shall be compartmentalized using joint plugs and silicone sealant to divert water to the horizontal weep locations.
   2. Weep holes shall be located in the horizontal pressure plates and covers to divert water to the exterior of the building.

E. Install perimeter joint sealants as specified in Section 079200 - JOINT SEALANTS to produce weathertight installation.

3.04 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment:
   a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
   b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.05 FIELD QUALITY CONTROL

A. Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows and in successive phases as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
   1. Air Infiltration: Areas shall be tested for air leakage of 1.5 times the rate specified for laboratory testing under "Performance Requirements" Article, but not more than 0.09 cfm / sq. ft. of fixed wall area when tested according to ASTM E283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft.
   2. Water Infiltration: Conduct tests in accordance with ASTM E1105. 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.

B. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

D. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.

E. Manufacturer's Field Services:
   1. Upon owner’s written request, provide periodic site visit by manufacturer’s field service representative.

F. Prepare test and inspection reports.

3.06 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.
   1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

3.07 CLEANING AND PROTECTION

A. Protect installed product’s finish surfaces from damage during construction.

B. Protect aluminum curtain wall system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

C. Clean aluminum surfaces immediately after installing aluminum-framed door, curtain walls and storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

D. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove non-permanent labels, and clean surfaces.

E. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

F. Remove construction debris from project site and legally dispose of debris

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sliding Service <> window unit(s) (Projection Room)

1.02 REFERENCE STANDARDS

A. AAMA 611 - Specification for Anodized Architectural Aluminum; 2024.

B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018 (Reapproved 2024).

D. ITS (DIR) - Directory of Listed Products; Current Edition.

E. UL (DIR) - Online Certifications Directory; Current Edition.

F. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate work with adjacent materials specified in other sections and as indicated on drawings and approved shop drawings.

1.04 SUBMITTALS

A. See Section 013300 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's product data for specified products indicating materials, operation, glazing, finishes, and installation instructions.

C. Shop Drawings: Indicate configuration, sizes, rough-in, mounting, anchors and fasteners, and installation clearances.

D. Test Data: Test reports for specific window model and glazing to be furnished, showing compliance with all specified requirements; window and glazing may be tested separately, provided window test sample adequately simulates the glazing to be used.

E. Samples for Selection of Finishes:
   1. Color Anodized Finishes: Frame member sections showing range of color to be expected in finished work.

F. Manufacturer Qualification Statement.

G. Installer Qualification Statement.

H. Testing Agency Qualification Statement.

I. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with at least ten (10) years documented experience, and with ability to provide test reports showing that their standard manufactured products meet the specified requirements.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three (3) years of documented experience.

C. Testing Agency Qualifications: Independent testing agency with documented experience in conducting tests of the type specified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver units in manufacturer's original packaging and unopened containers with identification labels intact.

B. Store units in area protected from exposure to weather and vandalism.

1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. The manufacturer shall warrant the product against material defects or defects in manufacturing. If a defect is discovered and brought to the attention of the Manufacturer, the defect will be corrected at no cost to the owner. Warranty shall not be pro-rated. Warranties requiring the owner to return windows to the factory for repair or replacement shall not be accepted. Provide manufacturer's warranty agreeing to repair or replace units and their components that fail in materials or workmanship within five (5) years from Date of Substantial Completion.
   1. Provide manufacturer's warranty agreeing to repair or replace units and their components that fail in materials or workmanship within ten (10) years from Date of Substantial Completion.
   2. Finish: warranty supplied by finish manufacturer.

PART 2 PRODUCTS

2.01 SERVICE <> WINDOW UNITS

A. Manufacturers :
   1. CRL - C.R. Laurence Co., Inc. (Basis of Design) Tel.: 800.421.6144
   2. Krieger Specialty Products LLC
   3. Substitutions: See Section 016100 - Product Requirements and Section 012500 - Substitution Procedures.

B. Location: Built within interior wall, as indicated on drawings.

C. Type of Use: As indicated on drawings.

D. Service Windows:
   1. Models:
      a. SCW940 - Horizontal Rolling
   2. Operation: Manual
   3. Mounting: As indicated on the drawings.
   4. Window Sizes: As indicated on drawings.
   5. Material: Aluminum.
      a. Finish Color: As selected from manufacturer's standard colors.

E. Glazing: Single (monolithic), clear.
   1. Tempered safety glazing comprised of 1/4 inch clear glass.

F. Products:
   1. Substitutions: See Section - 016100 - BASIC PRODUCTS REQUIREMENTS.

2.02 COMPONENTS

A. Windows: Factory-fabricated, finished, and glazed, with extruded aluminum frame and glazing stops; complete with hardware and anchors.
   1. Provide window units that are re-glazable from the secure side without dismantling the non-secure side of framing.
   2. Rigidly fit and secure joints and corners with internal reinforcement. Make joints and connections flush, hairline, and weatherproof. Fully weld corners.
   3. Apply factory finish to all exposed surfaces.
   4. Apply bituminous paint to concealed metal surfaces in contact with cementitious or dissimilar materials.
   5. Self-Closing Operation: Manual open and self-closing with auto-locking handles and magnetic hold-open device.
   6. Configuration: As indicated on the drawings.

2.03 MATERIALS

A. Aluminum Extrusions: Aluminum alloy 6063-T6. Minimum 0.062 inch thick frame and sash material complying with ASTM B221 and ASTM B221M.

1. Finish: Class I natural anodized.

B. Exterior and interior frame sill shall have a minimum slope of 5 degrees.

C. Monolithic Glass:
1. Laminated safety glazing comprised of 1/4 inch clear glass with 0.06 PVB clear interlayer and 1/4 inch clear glass.

D. Gaskets
1. All corner joints of the master frame shall have neoprene gaskets to insure a weather-tight seal.

E. Hardware:
1. All interior sash rails shall have a spring-loaded extruded metal self-latching lock.
2. Sash Rollers: All horizontal rolling window sashes shall have a minimum of two sash rollers per sash made of Delrin material operating on a stainless steel axle. Rollers shall be recessed into the bottom sash rail so as not to protrude beyond the sash extrusion or weather-strip.
3. Balances: All sashes must be fully balanced with a minimum of two balances per sash. Balances are to be made of zinc die cast metal with nylon rollers. Balances must provide a positive lifting force through the full range of sash travel and hold the sash stationary at any open position without the use of auxiliary frictional devices or holding pins. Balances are to be housed inside of jamb sash rails and made removable with the use of take-out clips for ease of replacement without the use of special tools.

F. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

G. Sealants: Polyurethane or Polyether sealant conforming to ASTM C920 as manufactured by Pecora, Tremco, Vulkem, or an Architect approved equivalent. Sealants shall be applied per the installation drawings and details at all points where the aluminum master frame and/or panning intersects the masonry or other exterior wall finishes. The sealant material shall be applied in a manner which insures a continuous air- and water-tight perimeter seal. Color to match the color of the aluminum windows unless specified otherwise by the Architect.

2.04 FABRICATION

A. Window shall consist of two separate frames permanently interlocked by a rigid vinyl thermal-barrier. All joints of the frame and sash shall be butt type, secured by means of thread-cutting type screws anchored into screw ports which shall be an integral part of frame members. All corner joints shall be joined neatly in a manner to provide weather-tight connection. Sash corners to be internally sealed. All sharp milled edges and corners of sash and screen frame shall be de-burred and made smooth. The meeting rail shall be of tubular construction, double weather-stripped and interlocked when in a closed position. Window unit is to be constructed in a manner that will facilitate the replacement of worn or damaged parts, hardware, or weather-strip.

2.05 FINISHES

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick.

2.06 ACCESSORIES

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that window openings are ready for installation of windows.

B. Verify that correct embedded anchors are in place and in proper location; repair or replace anchors as required to achieve satisfactory installation.

C. Notify Architect/Engineer if conditions are not suitable for installation of units; do not proceed until conditions are satisfactory.

3.02 INSTALLATION

A. Window and related window components shall be installed in accordance with requirements of the owner, the manufacturer's specifications and approved shop drawings. Installation shall be accomplished by a installer meeting the Installer Qualifications specified in this section.

B. Install units in correct orientation (inside/outside or secure/non-secure).

C. Anchor units securely in manner so as to achieve performance specified.

D. Windows shall be erected plumb, level and true, relative to the building structure. The maximum variation from plumb and level shall not exceed 1/8” (plus or minus) over ten feet

E. Set sill members and sill flashing in continuous bead of sealant.

F. Approved insulation materials shall be installed in the frame cavity on the interior portion of the window frame. The window installer shall use caution in the insulation operation to avoid overlapping insulation materials across the thermal-barrier connector thus bridging the two separate frame members

G. Remove and replace defective work.

3.03 ADJUSTING

A. Adjust operating components for smooth operation while also maintaining a secure, weather-tight enclosure and a tight fit at the contact points; lubricate operating hardware.

3.04 CLEANING

A. Remove protective material from factory finished surfaces.

B. Remove all sealant, caulking and other misplaced materials from all surfaces, including adjacent work. The window frames, casing, and glass shall be thoroughly cleaned with materials and methods recommended by the window and glass manufacturer and shall not cause any defacement of the work.

3.05 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain operable units.
   1. Instructor: Manufacturer's training personnel.
   2. Location: At project site.
   3. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

3.06 PROTECTION

A. Protection of glass and window materials: Protect from contact with contaminating substances resulting from construction operations. After installation and cleaning of windows by window contractor, the general contractor shall be responsible for maintaining the cleanliness and protection of the windows from damage up to an including the date of Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 "General Requirements" sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
   a. "Metal Doors and Frames"
   b. "Flush Wood Doors"
   c. "Stile and Rail Wood Doors"
   d. "Interior Aluminum Doors and Frames"
   e. "Aluminum-Framed Entrances and Storefronts"
   f. "Special Function Doors"
6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature

4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
   a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
   b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
   a. Wiring Diagrams: For power, signal, and control wiring and including:
      1) Details of interface of electrified door hardware and building safety and security systems.
      2) Schematic diagram of systems that interface with electrified door hardware.
      3) Point-to-point wiring.
      4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
   a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:

a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
c. Indicate complete designations of each item required for each opening, include:
    1) Door Index: door number, heading number, and Architect's hardware set number.
    2) Quantity, type, style, function, size, and finish of each hardware item.
    3) Name and manufacturer of each item.
    4) Fastenings and other pertinent information.
    5) Location of each hardware set cross-referenced to indications on Drawings.
    6) Explanation of all abbreviations, symbols, and codes contained in schedule.
    7) Mounting locations for hardware.
    8) Door and frame sizes and materials.
    9) Degree of door swing and handing.
    10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:
    a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
    b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
    c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
    d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
    e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
    f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
    a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
    b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
    a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
    b. Catalog pages for each product.
    c. Final approved hardware schedule edited to reflect conditions as installed.
    d. Final keying schedule

e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
   a. Fire door assemblies, in compliance with NFPA 80.
   b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
   a. For door hardware: DHI certified AHC or DHC.
   b. Can provide installation and technical data to Architect and other related subcontractors.
   c. Can inspect and verify components are in working order upon completion of installation.
   d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.

4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
   a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
   b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

2. Smoke and Draft Control Door Assemblies:
   a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105

b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware
   a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

4. Accessibility Requirements:
   a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
   a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      2) Preliminary key system schematic diagram.
      3) Requirements for key control system.
      4) Requirements for access control.
      5) Address for delivery of keys.

2. Pre-installation Conference
   a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   b. Inspect and discuss preparatory work performed by other trades.
   c. Inspect and discuss electrical roughing-in for electrified door hardware.
   d. Review sequence of operation for each type of electrified door hardware.
   e. Review required testing, inspecting, and certifying procedures.
   f. Review questions or concerns related to proper installation and adjustment of door hardware.

3. Electrified Hardware Coordination Conference:
   a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.

C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.

1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.

1.08 MAINTENANCE

A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.

B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.

C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer’s recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with “Metal Doors and Frames”, “Flush Wood Doors”, “Stile and Rail Wood Doors” to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

C. Cable and Connectors:

1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Ives 5BB series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
   a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
   b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high

4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
   a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
   b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. 2 inches or thicker doors:
   a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
   b. Interior: Heavy weight, steel, 5 inches (127 mm) high

6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
   a. Steel Hinges: Steel pins
   b. Non-Ferrous Hinges: Stainless steel pins
   c. Out-Swinging Exterior Doors: Non-removable pins
   d. Out-Swinging Interior Lockable Doors: Non-removable pins
   e. Interior Non-lockable Doors: Non-rising pins

9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 SPRING HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Ives 3SP series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide 3 knuckle, steel based, spring full mortise hinges.
3. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
4. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Do not use spring hinges of door 96 inches and greater in height.

2.05 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.

6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.06 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. Von Duprin EPT-10

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.07 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.08 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes, or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

2.09 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage ND series

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide escutcheon with lock status indicator window on top of lockset rose:
   a. Escutcheon height (including rose) 6.05 inches high by 3.68 inches wide.
   b. Indicator window measuring a minimum 3.52-inch by .60 inch with 1.92 square-inches of front facing viewing area and 180-degree visibility with a total of .236 square-inches of total viewable area.
   c. Provide snap-in serviceable window to prevent tampering. Lock must function if indicator is compromised.
   d. Provide messages color-coded with full text and symbol, as scheduled, for easy visibility.
   e. Unlocked and Unoccupied message will display on white background, and Locked and Occupied message will display on red background.
3. Cylinders: Refer to "KEYING" article, herein.
4. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
5. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
6. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
8. Provide electrified options as scheduled in the hardware sets.
9. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.

2.10 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Von Duprin 98/35A series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.

8. Provide exit devices with manufacturer's approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
17. Special Options:
    a. SI
        1) Provide dogging indicators for visible indication of dogging status.

2.11 ELECTRIC STRIKES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
    a. Von Duprin 6000 Series

B. Requirements:

1. Provide electric strikes designed for use with type of locks shown at each opening.
2. Provide electric strikes UL Listed as burglary resistant that are tested to a minimum endurance test of 1,000,000 cycles.
3. Where required, provide electric strikes UL Listed for fire doors and frames.
4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

2.12 CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
    a. Schlage Everest 29 R

B. Requirements:

1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer’s series as indicated. Refer to “KEYING” article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
    a. Patented Restricted Small Format: cylinder with small format interchangeable cores (SFIC) with restricted, patented keyway.

3. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent protected.
4. Nickel silver bottom pins.

2.13 KEYING

A. Scheduled System:

1. Existing factory registered system:
   a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Permanent Keying:
   a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
      1) Master Keying system as directed by the Owner.
   b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
   c. Provide keys with the following features:
      1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
      2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
   d. Identification:
      1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
      2) Identification stamping provisions must be approved by the Architect and Owner.
      3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
      4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
      5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
   e. Quantity: Furnish in the following quantities.
      1) Permanent Control Keys: 3.
      2) Master Keys: 6.
      3) Change (Day) Keys: 3 per cylinder/core that is keyed differently
      4) Key Blanks: Quantity as determined in the keying meeting.

2.14 KEY MANAGEMENT SOFTWARE

A. Requirements

1. Provide training and onboarding, including:

2.15 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Telkee

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
   a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
   b. Provide hinged-panel type cabinet for wall mounting.

2.16 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. LCN 4040XP series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
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. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
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.
11. Closers shall be capable of being upgraded by adding modular mechanical or electronic components in the field.

2.17 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.18 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.19 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
   a. Glynn-Johnson

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.20 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.21 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
   a. Zero International
   b. No Substitute
   c. National Guard
   d. Reese
   e. Pemko

3. Omit where gasketing is specified.

2.22 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

B. Scheduled Manufacturer:

1. Zero International

C. Acceptable Manufacturers:

1. No Substitute
2. National Guard
3. Reese
4. Pemko

D. Seals and Gasketing: Provide continuous gasketing on exterior openings, to the head and jambs, forming a continuous seal between the door and the frame. Provide smoke, light, or sound gasketing on interior doors where indicated.

1. Provide self-tapping fasteners for aluminum extruded gasketing being applied to hollow metal frames.
   a. Provide non-corrosive fasteners for all exterior applications.
   b. Provide security fasteners where indicated.

2. Provide neoprene, EPDM, silicone, or nylon brush inserts as specified in hardware sets. Provide non brush inserts of solid or sponge cell, as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

E. Smoke Labeled Gasketing: At all smoke labeled openings, provide smoke listed perimeter gasketing assemblies complying with NFPA 105 listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for smoke control ratings indicated based on testing according to UL 1784.

F. Fire Listed Gasketing: Assemblies complying with NFPA 80 that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction for fire ratings indicated based on testing according to UL-10C.

1. Where frame-applied intumescent seals are required by the manufacturer, provide gaskets that comply with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies and UBC 7-2, Fire Tests of Door Assemblies.

G. Sound-Rated Gasketing: Provide acoustic gasketing to meet Sound Transmission Class (STC) rating required.

H. Meeting-Stile Gasketing: Provide meeting-stile gasketing that fastens to the meeting stiles forming a continuous seal when doors are closed.

I. Door Sweeps or Shoes: Apply to the bottom of the door to close the gap between the door bottom and finished floor or saddle threshold.

1. Provide solid neoprene, EPDM, silicone, or nylon brush type of seal as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

J. Automatic Door Bottoms:

1. Provide closed cell sponge, bulb neoprene. or EPDM type of seal as specified in hardware sets.
2. Door bottom to be mortised, semi mortised, or surface mount as with a minimum thickness as specified in hardware sets.

K. Rain Drips:

1. Provide overhead rain drips for out-swinging hollow metal doors that are not covered against 45 degree blowing rain. Aluminum extrusion to be a minimum of .088 inches thick and extend 2.50 inches from the face of the frame, in anodized finish to match door.
2. Door sweeps or shoes with integral rain drip must meet ADA requirements

L. Thresholds: Provide threshold units not less than 4 inches wide, formed to accommodate change in floor elevation where indicated, and fabricated to accommodate door hardware and fit door frames.

1. Threshold extrusion to be a minimum thickness as specified in hardware sets.

2.23 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Schlage

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. 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.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
4. Installation Guide for Doors and Hardware: DHI TDH-007-20

B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.

C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

I. Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.
3. Furnish permanent cores to Owner for installation.

J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Connections to panel interface modules, controllers, and gateways.
6. Testing and labeling wires with Architect's opening number.

K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

L. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.

M. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

N. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

O. 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.

P. Thresholds:

1. Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
2. Aluminum thresholds to be cut-in, and scribed around mullions, frame members, and stops. Do not butt to thresholds. Provide a continuous surface across full width of opening from jamb to jamb.
3. Where aluminum panic-type (rabbeted) thresholds with neoprene inserts are specified, undercut doors as required to properly mate with seal in threshold.

Q. 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.

R. Perimeter Gasketing:

1. Apply to head and jamb, forming seal between door and frame.
2. Install gasketing in a manner eliminating need to cut any seal to install surface mounted hardware. Install compatible mounting bracket for surface mounted hardware unless minimum 1/4 inch thick solid aluminum seals are provided for mounting of surface applied hardware.

S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

T. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

Abbreviations:

Abbreviation	Name
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
LCN	LCN Commercial Division
SCE	Schlage Electronic Security
SCH	Schlage Lock Company
VON	Von Duprin
ZER	Zero International Inc

Door Hardware Index:

Door Numbers	Hardware Group No.
1	02
1A	CR02.1
1B	CR02
1B-1	CR01
2	01
3	02
4	01
5	02
6	02-1
7	03
8	04
9	04
10	03
11	02-1
12	05
13	05
14	06
15	06
16	06
17	06
18	06

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Hw# 01

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 5 X 4.5 NRP		652	IVE
2	EA	FIRE EXIT HARDWARE	9827-L-F-2SI-LBRAFL-06-499F		626	VON
4	EA	SFIC RIM CYLINDER	80-159		626	SCH
4	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	FLOOR STOP	FS436		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hw# 02

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	STOREROOM LOCK	ND80HD RHO		626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	4040XP		689	LCN
1	EA	WALL STOP	WS406/407CCV		626	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hw# 02-1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	STOREROOM LOCK	ND80HD RHO		626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hw# 03

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 5 X 4.5 NRP		652	IVE
1	EA	FIRE EXIT HARDWARE	98-L-F-2SI-06		626	VON
1	EA	SFIC MORTISE CYL.	80-132 CAM AS REQ.		626	SCH
1	EA	SFIC RIM CYLINDER	80-159		626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hw# 04

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	AUTO FLUSH BOLT	FB41P		630	IVE
1	EA	CLASSROOM SECURITY W/ INSIDE INDICATOR	ND78HD RHO IS-CRS		626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	COORDINATOR	COR X FL		628	IVE
2	EA	OH STOP	90S		652	GLY
2	EA	SURFACE CLOSER	4040XP		689	LCN
2	EA	MOUNTING PLATE	4040XP-18 SRT		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

A CONFLICT MAY OCCUR BETWEEN THE GJ O/H STOP AND THE CLOSER BODY, THE DROP PLATE MAY BE NEEDED AND DRILLED OUT TO ALLOW THE THRU-BOLTS OF THE O/H STOP TO BE INSTALLED.

Hw# 05

Provide each DE door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 5 X 4.5		652	IVE
2	EA	FIRE EXIT HARDWARE	9827-EO-F-LBRAFL-499F		626	VON
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	MAGNET	SEM7820 12V/24V/120V	✓	689	LCN
1	EA	GASKETING	488SBK PSA		BK	ZER

OPERATIONAL DESCRIPTION: MAGNETIC HOLD OPEN TIED INTO FIRE ALARM SYSTEM TO RELEASE UPON FIRE ALARM ACTIVATION.

Hw# 06

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	SPRING HINGE	3SP1 4.5 X 4.5		652	IVE
1	EA	AUTO FLUSH BOLT	FB42		630	IVE
1	EA	STOREROOM LOCK	ND80HD RHO 7/8" STRIKE LIP TO CENTER		626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
2	EA	OH STOP	90S		652	GLY
1	EA	GASKETING	488SBK PSA		BK	ZER

SPRING HINGES TO BE ADJUSTED SO THAT INACTIVE DOOR TO CLOSE BEFORE ACTIVE DOOR

Hw# CR01

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY EPT		628	IVE
1	EA	POWER TRANSFER	EPT10 CON	✓	689	VON
1	EA	ELEC PANIC HARDWARE	LD-RX-LC-98-EO-CON	✓	626	VON
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	DOOR SWEEP	328AA		AA	ZER
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER			
1	EA	THRESHOLD	655A		A	ZER
1	EA	WIRE HARNESS	CON-XX-P LENGTH AS REQUIRED	✓		SCH
1	EA	WIRE HARNESS	CON-6W	✓		SCH
1	EA	DOOR CONTACT	7764	✓	628	SCE
	EA	POWER SUPPLY	BY SECURITY			

Hw# CR02

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224XY EPT		628	IVE
2	EA	POWER TRANSFER	EPT10 CON		689	VON
1	EA	REMOVABLE MULLION	KR4854 STAB		689	VON
1	EA	ELEC PANIC HARDWARE	LD-RX-LC-98-EO-CON		626	VON
1	EA	ELEC PANIC HARDWARE	LD-RX-LC-98-NL-OP-110MD-CON		626	VON
1	EA	SFIC MORTISE CYL.	80-132 CAM AS REQ.		626	SCH
1	EA	SFIC RIM CYLINDER	80-159		626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	ELECTRIC STRIKE	6111 FSE (SPECIFY VOLTAGE)		630	VON
2	EA	90 DEG OFFSET PULL	8190HD 10" STD		630	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
2	EA	DOOR SWEEP	328AA		AA	ZER
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER			
1	EA	THRESHOLD	655A		A	ZER
2	EA	WIRE HARNESS	CON-XX-P LENGTH AS REQUIRED			SCH
2	EA	WIRE HARNESS	CON-6W			SCH
1	EA	CARD READER	BY SECURITY			
2	EA	DOOR CONTACT	7764		628	SCE
1	EA	POWER SUPPLY	BY SECURITY			

OPERATIONAL DESCRIPTION:
1. IMMEDIATE EGRESS ALWAYS ALLOWED
2.ACCESS BY KEY OR CREDENTIAL
3. KEY UNLOCKS LOCKSET
4. CARD READER TO RELEASE ELECTRIC STRIKE
5. DOOR CONTACT AND REQUEST TO EXIT CONNECTED TO BUILDING SECURITY SYSTEM

Hw# CR02.1

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
2	EA	CONT. HINGE	224XY EPT			628	IVE
2	EA	POWER TRANSFER	EPT10 CON			689	VON
1	EA	REMOVABLE MULLION	KR4854 STAB			689	VON
1	EA	ELEC PANIC HARDWARE	LD-RX-LC-98-EO-CON			626	VON
1	EA	ELEC PANIC HARDWARE	LD-RX-LC-98-NL-OP-110MD-CON			626	VON
1	EA	SFIC MORTISE CYL.	80-132 CAM AS REQ.			626	SCH
1	EA	SFIC RIM CYLINDER	80-159			626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R			626	SCH
1	EA	ELECTRIC STRIKE	6111 FSE (SPECIFY VOLTAGE)			630	VON
2	EA	90 DEG OFFSET PULL	8190HD 10" STD			630	IVE
2	EA	SURFACE CLOSER	4040XP EDA			689	LCN
1	EA	SURFACE CLOSER	4040XP SCUSH			689	LCN
1	EA	FLOOR STOP	FS18L			BLK	IVE
2	EA	DOOR SWEEP	328AA			AA	ZER
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER				
1	EA	THRESHOLD	655A			A	ZER
2	EA	WIRE HARNESS	CON-XX-P LENGTH AS REQUIRED				SCH
2	EA	WIRE HARNESS	CON-6W				SCH
1	EA	CARD READER	BY SECURITY				
2	EA	DOOR CONTACT	7764			628	SCE
1	EA	POWER SUPPLY	BY SECURITY				

OPERATIONAL DESCRIPTION:
1. IMMEDIATE EGRESS ALWAYS ALLOWED
2.ACCESS BY KEY OR CREDENTIAL
3. KEY UNLOCKS LOCKSET
4. CARD READER TO RELEASE ELECTRIC STRIKE
5. DOOR CONTACT AND REQUEST TO EXIT CONNECTED TO BUILDING SECURITY SYSTEM

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
   1. Door and Window glazing.

1.03 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C1036.

C. Interspace: Space between lites of an insulating-glass unit.

D. 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 or the interlayer surface of the first layer of laminated glass.
   5. Surface #5 - Interlayer surface of the second layer of laminated glass.
   6. Surface #6 - Interior surface of the second layer of laminated glass.

1.04 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E1300 by a New York State licensed professional engineer, using the following design criteria:
   1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
      a. Wind Design Data: As indicated on Drawings.
      b. Basic Wind Speed: 135 mph.
      c. Risk Category: III.
   2. Design Snow Loads: As indicated on Drawings.
   3. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
   4. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
   1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.05 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type; 12 inches (300 mm) square.
   1. Fire-resistive glazing products.
   2. Insulating glass.

C. Glazing Accessory Samples: For gaskets sealants and colored spacers, in 12-inch (300-mm) lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.06 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installers manufacturers of insulating-glass units with sputter-coated, low-e coatings glass testing agency and sealant testing agency.

B. Product Certificates: For glass and glazing products, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for tinted glass coated glass insulating glass glazing sealants and glazing gaskets.
   1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

D. Warranties: Sample of special warranties.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

E. Source Limitations for Glass: Obtain tinted float glass coated float glass laminated glass and insulating glass from single source from single manufacturer for each glass type.

F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
   1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
   2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

I. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (232 deg C), and the fire-resistance rating in minutes. Fire

resistance rated assemblies must be tested in accordance with ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials.

J. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

K. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.09 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
   1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
   1. Warranty Period: Ten (10) years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
   1. Warranty Period: Ten (10) years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to 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. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
   1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
   2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements"

Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes enhanced-protection testing requirements in ASTM E1996 for Wind Zone 1 when tested according to ASTM E1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.
   1. Large-Missile Test: For all glazing, regardless of height above grade.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
   1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
   2. For laminated-glass lites, properties are based on products of construction indicated.
   3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
   4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
   5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
   6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.02 GLASS PRODUCTS

A. Uncoated Tinted Float Glass: Class 2, complying with other requirements specified.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Solargray by PPG Industries or comparable product by one of the following:
      a. EFCO.
      b. Guardian Industries.
   2. Tint Color: Clear and StarPhire. As selected by the Owner and Architect.
   3. Visible Light Transmittance: 76 for Clear glazing and 54 for Gray Tinted glazing percent minimum.

2.03 LAMINATED GLASS

A. Laminated Glass: ASTM C1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
   1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.
   2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
   3. Interlayer Color: Clear unless otherwise indicated.

2.04 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190, and complying with other requirements specified.
   1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
   2. Spacer: Manufacturer's standard warm edge spacer material and construction .
   3. Desiccant: Molecular sieve or silica gel, or blend of both.

B. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article as indicated by designations in "Insulating-Glass Types" Article and in "Insulating-Laminated-Glass Types" Article.

2.05 FIRE-PROTECTIVE GLAZING

A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies.

B. Monolithic Ceramic Glazing: Clear, ceramic flat glass composed of glazing and fire-rated surface applied film, impact safety-rated glazing material, 3/16-inch (5-mm) nominal thickness.
   1. Products : Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. TGP; Firelite NT
      b. McGrory Glass; Schott Pyran Platinum F
      c. Vetrotech Saint-Gobain; Keralite Select FR-F (Safety Film)

C. Laminated Fire-Rated (20 to 180 minutes), High Impact Safety-Rated Ceramic Glass, Ultra-HD technology, 5/16 inch thickness meeting CPSC 16 CFR 1201 (Cat. I and II) and ANSI Z97.1 , withstands thermal shock. 5-year limited warranty. Surface Grade - Standard.
   1. Products : Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. TGP Firelite Plus
      b. McGrory Glass; Pyran Platinum L
      c. Verotech Saint-Gobain; Keralite Select FR-L
      d. Armoured One
      e. Architect approved equivalent.

2.06 FIRE-RESISTANCE RATED GLAZING

A. Multi-laminate Fire-Rated (45 to 120 minutes), Impact Safety-Rated Fireglass multi-laminate glass with clear intumescent interlayers, interior and exterior use, meets CPSC 16 CFR 1201 (Cat. I and II) and ANSI Z97.1 and providing protection against radiant and conductive heat transfer as per ASTM E119 and UL 263, withstands thermal shock. 5-year limited warranty. .
   1. Products : Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Pilkington Pyrostop: 45-200: 45 min., 3/4 inch thick, STC 40, U-Value - .86.
      b. AGC Pyrobel by McGrory Glass: 45-120: 45 min., 3/4 inch thick.
      c. Architect approved equivalent.

B. Fire-rated glazed assemblies requiring compliance to ASTM E119: Glazing shall be Pilkington PyroStop; AGC Pyrobel by McGrory Glass or approved equal. Glazing shall be Clear, laminated fully insulating fire and impact-resistant glass or as selected by the Architect.

2.07 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
   1. Neoprene complying with ASTM C864.
   2. EPDM complying with ASTM C864.
   3. Silicone complying with ASTM C1115.
   4. Thermoplastic polyolefin rubber complying with ASTM C1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene EPDM gaskets complying with ASTM C509, Type II, black; of profile and hardness required to maintain watertight seal.
   1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.08 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
a. Dow Corning Corporation; 790
b. GE Advanced Materials - Silicones; SilPruf LM SCS2700
c. Pecora Corporation; 890
d. Sika Corporation, Construction Products Division; SikaSil-C990
e. Tremco Incorporated; Spectrem 1

C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

2.09 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.10 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.11 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit 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.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

2.12 MONOLITHIC-GLASS TYPES

A. Glass Type MG-1 Clear fully tempered float glass.
   1. Thickness: 1/4 inch (6.0 mm) as indicated on the drawings.
   2. Provide safety glazing labeling.

2.13 INTERIOR LAMINATED-GLASS TYPES

A. Glass Type ILG-1: Clear laminated glass with two plies of fully tempered float glass with etched surface pattern.
   1. Thickness of Each Glass Ply: 0.118 inch (3.0 mm).
   2. Interlayer Thickness: 0.090 inch (2.29 mm).
   3. Provide safety glazing labeling.
   4. Provide acid-etched banding as indicated on the drawings.

B. Glass Type ILG-2: Fire-rated laminated glass
   1. Thickness: 5/16 inch (8.0 mm).5/16 inch (8.0 mm)
   2. Provide safety glazing label- CSPC 16 CFR 1201 Cat. I and II.
   3. Manufacturer: TGP Firelite Plus; McGrory Glass Pyran Platinum L, Armoured One or Architect approved equivalent.

2.14 INSULATING GLASS TYPES

A. Interior Glass Type IIG-1: insulating glass.
   1. Overall Unit Thickness: 1 inch.
   2. Exterior Glass Lite: 1/4 inch tempered StarPhire glass.
   3. Interspace Content: Air (10%) / Argon (45%) / Krypton (45%).
   4. Interspace Gap Size: 1/2 inch
   5. Interior Glass Lite: 1/4 inch tempered StarPhire glass.

B. Exterior Glass Type EIG-1: Low-E coated, insulating glass.
   1. Overall Unit Thickness: 1 inch.
   2. Exterior Glass Lite: 1/4 inch tempered Guardian SuperNeutral SNX 62/27 Low-E (2) Crystal Gray glass.
   3. Interspace Content: Air (10%) / Argon (45%) / Krypton (45%).
   4. Interspace Gap Size: 1/2 inch
   5. Indoor Glass Lite: 1/4 inch tempered StarPhire glass
   6. Visible Light Transmittance: 44 percent minimum.
   7. Winter Nighttime U-Factor: 0.24 maximum.
   8. Solar Heat Gain Coefficient:0.21 maximum.

2.15 EXTERIOR LAMINATED INSULATING GLASS TYPES

A. Glass Type ELIG-<>: Low-e-coated, insulating glass.

1. Overall Unit Thickness: 1.31 (with 0.060 PVB interlayer - 1/4" glass).
2. Exterior Glass Lite: 1/4 inch tempered Guardian SuperNeutral SN68 Low-E (2) Crystal Gray glass.
3. Interspace Content: Air (10%) / Argon (45%) / Krypton (45%).
4. Interspace Gap Size: 1/2 inch
5. Indoor Glass Lite: 1/4 inch heat strengthened Clear - 0.060 inch Clear PVB - 1/4 inch heat strengthened Clear.
6. Visible Light Transmittance: 35 percent minimum.
7. Winter Nighttime U-Factor: 0.24 maximum.
8. Solar Heat Gain Coefficient: 0.25 maximum.
9. Provide safety glazing labeling.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
   1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
   2. Presence and functioning of weep systems.
   3. Minimum required face and edge clearances.
   4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.03 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.04 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.05 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.06 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.07 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove non-permanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.02 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Interior gypsum wallboard.
   2. Tile backing panels.
   3. Non-load-bearing steel framing.
   4. Installation of metal access panels.

1.03 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide fire stop tracks capable of withstanding deflection within limits and under conditions indicated.
   1. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: Full-size Sample in 12-inch-long length for each trim accessory indicated.

1.05 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

C. Drywall Recycling: All new paper-faced gypsum wallboard scrap (cuts from construction but not demolition waste) shall be recycled by Gypsum Recycling America LLC or approved equal.

D. Unit Mock-up: Provide materials, products, and components as specified herein for 1 complete 1-bedroom unit mock-up and 1 short corridor mock-up. Refer to Section 014330 – Mock-ups for additional requirements.

E. Mockups: Before beginning gypsum board installation, install mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Install mockups for the following:
      a. Each level of gypsum board finish indicated for use in exposed locations.
      b. Each texture finish indicated.
   2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
   3. Simulate finished lighting conditions for review of mockups.

1.06 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.08 WARRANTY

A. Special Manufacturer's Warranty: Provide manufacturer's standard form in which manufacturer agrees to repair, restore, or replace defective work within specified warranty period.
   1. Warranty Period: As standard with manufacturer unless indicated otherwise.

PART 2 - PRODUCTS

2.01 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
   1. Steel Sheet Components: Comply with ASTM C645 requirements for metal, unless otherwise indicated.
   2. Protective Coating: manufacturer's standard corrosion-resistant zinc coating, unless otherwise indicated.
   3. Structural Requirements: Refer to structural drawings for additional requirements and locations.

2.02 SUSPENSION SYSTEM COMPONENTS

A. Tie Wire:ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.

B. Hanger Attachments to Concrete:
   1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E488/E488M by an independent testing agency.
      a. Type: Post installed, expansion anchor.

C. Wire Hangers: ASTM A641/A641M , Class 1 zinc coating, soft temper, 0.162-inch diameter.

D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch- wide flanges with depth as required for span and loading and indicated on Drawings.

E. Furring Channels (Furring Members): 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.

F. Grid Suspension System for Ceilings: :ASTM A645/A645M, direct-hung system composed of main beams and cross-furring members that interlock.
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. Armstrong World Industries, Inc.; Drywall Grid Systems.
      b. Chicago Metallic Corporation; Drywall Furring System.
   2. USG Corporation; Drywall Suspension System.

2.03 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C645.
   1. Minimum Base-Metal Thickness: 0.0312 inch.

B. Slip-Type Head Joints: Where indicated, provide one of the following:
   1. Single Long-Leg Runner System: ASTM C645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and

with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.

2. Double-Runner System: ASTM C645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
    a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
        1) Steel Network Inc. (The); VertiClip Series.
        2) Superior Metal Trim; Superior Flex Track System (SFT).

C. Fire Stop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness compatible with studs and in width to accommodate depth of studs.
1. Grace Construction Products; FlameSafe FlowTrak System.
2. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
3. Metal-Lite, Inc.; The System.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: 0.0312 inch.

E. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: 1-1/2 inches.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.

F. Hat-Shaped, Rigid Furring Channels: ASTM C645.
1. Minimum Base Metal Thickness: 0.0312 inch.
2. Depth: 1-1/2 inches.

G. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
1. Configuration: Asymmetrical.
2. Basis of Design: Provide Clark Dietrich Building Systems, RC-1 Pro Resilient Channel (RCUR); 25 gauge; or Architect approved equivalent.

H. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches wall attachment flange of 7/8 inch, minimum bare-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

I. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

J. Isolation Strip at Exterior Walls: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

2.04 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C1396/C1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
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. USG Corporation.
    b. G-P Gypsum.
    c. National Gypsum Company.
2. Prohibited Manufacturers: Gypsum board manufactured in China is not permitted.

B. Fire-Resistant Type X, Typical Locations: ASTM C1396/C1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

C. Fire-Resistant Type C:
1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

D. Moisture & Mold Resistant:
1. Use: Painted wallboard at toilet rooms, showers, janitor's closets, exposed to weather locations, and all other moist but not wet areas. Do not use behind tile nor at tub surrounds.
2. ASTM C1396/C1396M (Section 5), regular type except where Type C fire-resistant type is indicated or required to meet UL assembly types.
3. Basis of Design: DensArmor Plus by Georgia-Pacific.
4. Edges: Tapered.
5. Thickness: 5/8 inch or as indicated.

2.05 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.
1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. Expansion (control) joint.
e. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
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. Fry Reglet Corp.
b. Gordon, Inc.
c. Pittcon Industries.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221, Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.06 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:
1. Interior Gypsum Wallboard: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

D. Joint Compound for Exterior Applications:

1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:
1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.07 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Steel Drill Screws: ASTM C1002, unless otherwise indicated.
1. Use screws complying with ASTM C954 for fastening panels to steel members from
2. 0.033 to 0.112 inch thick.
3. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Acoustical Sealant: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Acoustical Sealant for Exposed and Concealed Joints:
a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
3. Acoustical Sealant for Concealed Joints:
a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
b. Pecora Corp.; BA-98.
c. Tremco, Inc.; Tremco Acoustical Sealant.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:
1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.

2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.03 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754. Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.04 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
      a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
      a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
   3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
   4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
   5. Do not attach hangers to steel roof deck.
   6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
   7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
   8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support..

F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

G. Installation Tolerances: Install suspension systems that are level to within [1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.05 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install studs so flanges within framing system point in same direction.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
   1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
   2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on doorframes; install runner track section (for cripple studs) at head and secure to jamb studs.
      a. Install two studs at each jamb, unless otherwise indicated.
      b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
      c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
   3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
   4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
      a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance- rated assembly indicated.
   5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
   6. Curved Partitions:
      a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
      b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches o.c.

D. Resilient Furring: Use Type W, 1” long fasteners for walls and 1-1/4” long fasteners for ceilings; don’t pinch channel against studs, joists, and trusses.

E. Direct Furring: Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Furring Members:
   1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches o.c.
   2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
   3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

3.06 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.
   1. Locate control and expansion joints where indicated on Drawings.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.07 APPLYING INTERIOR GYPSUM BOARD

A. Single-Layer Application:
   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels to minimize end joints.
   3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
   4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

B. Multilayer Application:
   1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance- rated assembly.
   2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
   3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
   4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

D. Curved Surfaces:
   1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.

2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.08 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
   1. Install with 1/4-inch trimmed open joint space where panels abut other construction or structural penetrations.
   2. Fasten with corrosion-resistant screws.

3.09 APPLYING TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A108.1a, at locations indicated to receive tile, with joints treated to comply with ANSI A108.11.

B. Areas Not Subject to Wetting: Install regular-type gypsum wallboard panels to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.

C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

D. Tile backing panels around bathtub surrounds shall continue up to ceiling and be skim coated at exposed locations above tile.

3.10 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C840 and in specific locations, indicated on Drawings and approved by Architect for visual effect.
   1. Spacing: Maximum spacing shall not exceed 30’-0”.
   2. Refer to Interior Design drawings.

C. Interior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners, unless otherwise indicated.
   2. LC-Bead: Use at exposed panel edges.
   3. Curved-Edge Cornerbead: Use at curved openings.
   4. PVC Tear-Away Beads: use at fenestration openings and intersections with other materials.

D. Exterior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners.
   2. LC-Bead: Use at exposed panel edges..

E. Aluminum Trim: Install in locations indicated on Drawings.

3.11 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below:
   1. Level 1: Ceiling plenum areas and concealed areas not exposed to view.
   2. Level 2: Panels that are substrate for tile.
   3. Level 3:
   4. Level 4: Panel surfaces that will be exposed to view (typical panels).
   5. Level 5: as indicated on the drawings .

E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.12 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, or exhibit mold growth. Repair of damaged panels in place is not acceptable.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

1.02 SECTION INCLUDES

A. Aluratone Ceiling Panels

B. Suspension Systems

1.03 REFERENCES

A. ASTM E84 - Title; 2001.

B. FSC STD-01-001 - FSC Principles and Criteria for Forest Stewardship

C. FSC STD-40-004 - FSC Standard for Chain of Custody Certification

1.04 DESIGN / PERFORMANCE REQUIREMENTS

A. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1:360.

B. Wood is a natural product that will undergo changes with variations in the environment. Therefore, all dimensional tolerances are plus or minus 1/8 inch (3.18 mm).

C. Seismic Suspended wood ceilings meet seismic code compliance via direct screw attachment to heavy duty grid. Local code requirements should be consulted in order to determine additional requirements.

D. Fire Performance Characteristics: Suspended wood ceilings shall conform to Class 1, or A flame spread rating, tested according to ASTM E84; Flame Spread: 25 or less. Smoke Developed: 450 or less.

E. Certified Wood: Suspended wood ceilings shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and FSC STD-40-004, "FSC Standard for Chain of Custody Certification

1.05 SUBMITTALS

A. Submit under provisions of SECTION 013300 - SUBMITTALS.

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.

C. Shop Drawings: Provide layout of suspended wood ceiling and T-rails coordinated with other trades that will penetrate the wood ceiling or interfere with the installation and recessed or surface mounted devices located within the ceiling panels. Indicate method of suspension where interference exists.

D. Selection Samples: For each finish product specified, two complete sets of color brochures representing the manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, three samples, minimum size 12 inches (304.8 mm) square, representing actual product, color, and patterns.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

G. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic checking and adjustment and periodic cleaning and maintenance of all components.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.

B. Installer Qualifications: Minimum two (2) years documented experience installing projects of similar size and complexity.

C. Provide seismic design of suspended ceiling under direct supervision of Professional Engineer experienced in design of this Work and licensed in the state where the Project is located.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.
   4. Accepted mock-ups shall be comparison standard for remaining Work

E. Pre-Installation Conference: Convene minimum two weeks prior to starting work of this section. Agenda shall include project conditions, coordination with work of other trades, and layout of items that penetrate ceilings.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver material in the manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store products off the floor in manufacturer's unopened packaging protected from exposure to harmful environmental conditions and at temperature and humidity conditions as recommended by the manufacturer.

C. A minimum of 72 hours prior to ceiling installation, suspended wood ceilings shall be stored in the room in which they will be installed. Temperature and humidity of the room during this period shall closely approximate those conditions that will exist when the building is occupied.

D. Handle materials to avoid damage.

1.08 SEQUENCING

A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.09 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Plenums have proper ventilation, especially in high moisture areas with no excessive buildup of heat in the ceiling areas.

C. Space shall be fully enclosed with all exterior windows and doors in place, glazed, and weather-stripped. Roof is to be watertight, and all wet trades' work is to be completed, and thoroughly dry.

D. Mechanical, electrical, and other utility services above the ceiling plane shall be completed. No materials should rest against, or wrap around, the ceiling suspension components or connecting hangers.

E. Install only when the temperature and humidity closely approximate the interior conditions that will exist when the building is occupied. Heating and cooling systems shall be operating before, during, and after installation, with the humidity of the interior spaces maintained between 25 and 55 percent, and a temperature between 60 to 90 degrees Fahrenheit (32.22 degrees Celsius).

1.10 COORDINATION

A. Coordinate layout and installation of the wood panel ceiling systems with other work penetrating the ceiling including light fixtures, HVAC equipment, and fire suppression system components.

1.11 EXTRA MATERIALS

A. See SECTION 016100 - BASIC PRODUCT REQUIREMENTS.

B. Deliver materials for Owner's use in maintenance.
   1. Provide three (3) percent of each type actually installed for use by owner in building maintenance and repair.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Rulon International, which is located at: 2000 Ring Way Rd.; St Augustine, FL 32092; Toll Free Tel: 800-227-8566; Tel: 904-584-1400; Fax: 904-584-1499; Email:request info (info@rulonco.com); Web:https://rulonco.com.

B. Architect approved equivalent.

C. Substitutions: See SECTION 012500 - PRODUCT SUBSTITUTION PROCEDURES and SECTION 016100 - BASIC PRODUCT REQUIREMENTS

2.02 MATERIALS - GENERAL

A. Wood is a natural product that will undergo changes with variations in the environment. Therefore, all dimensional tolerances are plus or minus 1/8 inch (3.18 mm).

2.03 ALURATONE CEILING PANELS (AP1)

A. System 700 PERFection, Series acoustic ceiling panels are provided with precision face perforations. Aluratone PERFection will have precision face perforations. The back of the 3/4 inch (19.05 mm) core is drilled so that the intersection of the face holes and back holes will create openings through the panel. Acoustical absorptive black backing is applied in the factory. Acoustical performance is dependent on project design, application, mounting method, and additional sound absorbent material. Acoustical performance can be achieved up to NRC-0.90.
   1. Panel Size: As indicated on the drawings
   2. Face Profile:
      a. Aluratone 750 is manufactured with 0.022 inch (0.56 mm) perforations on staggered centers. Substrate is Back-Bored to allow for increased open area and greater sound attenuation while minimizing visible face machining.
   3. Trim and Border Treatment: Provide end caps, junction trims, or edgebanding as indicated.
   4. Veneer Species:
      a. White Oak
   5. Finish:
      a. Satin Clear / stain to match architect sample

2.04 ACCESSORIES

A. C-Hangers: Suspension hangers that are direct-screwed to the panel and hang over the heavy duty-grid. Hangers are made of spring-steel with phosphate pre-treatment and corrosion-resistant coating.

B. Torsion Springs and Saddle Clips: Two parts of a suspension system in which the torsion spring is direct-screwed to the panel and compressed to attach to the saddle clip that is fitted over the heavy duty-grid. Springs and clips are made of spring-steel with phosphate pre-treatment and corrosion-resistant coating.

C. Acoustic Nonwoven Backers: Thin, sound-absorbing fabrics that can be applied to a substrate in order to increase sound attenuation.

D. Integrated Lighting System: Coordinate ceiling panels with lighting specified in SECTION 265000 - LIGHTING.

2.05 SUSPENSION SYSTEMS

A. Main Tees: Standard heavy duty 15/16 inch (23.81 mm) T-rail specified in Division 09.

2.06 FABRICATION

A. Edges, borders, and perimeter trims shall be indicated on the Drawings in accordance with the manufacturer's standard design details. All suspended wood ceiling products specified shall be supplied by the wood panel ceiling manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify that T-rail carriers specified in SECTION 092226 - SHORT SPAN METAL SUSPENSION SYSTEMS are in place, suspended and leveled in a direction perpendicular to the wooden strip direction of the wood panels.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Work shall not begin until the space is fully enclosed and glazed and all wet work is completed and dried out to the satisfaction manufacturer.

C. Temperature shall be at least 65 degrees Fahrenheit during the installation and thereafter.

D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction, including the following:
   1. Comply with ASTM C636/C636M and seismic design requirements indicated.
   2. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   3. Additional Hanger Wires: Wrapped tightly 3 full turns to structure and component at locations where imposed loads could cause deflection exceeding 1/360 span or tolerances specified below.

B. Use a laser leveling device to lay out and install the perimeter trim as specified.

C. Suspend wood slats from the T-rail carrier system with woodbacker clips.

D. Make final adjustments to level or contours as required.

3.04 FIELD QUALITY CONTROL

A. Technical Service: Manufacturer shall provide a local Technical Service Representative for on-site training and assistance during the installation process.

B. Environmental Monitoring: Manufacturer shall provide a temperature and humidity sensor to actively monitor the room in which the wood slats shall be installed for a minimum of one week before and up to two weeks after installation has been completed including all of the weeks in between.

C. Upon completion of ceiling installation, the owner's representative shall inspect all finished surfaces to ensure that the work has been completed in a manner satisfactory to the owner. Any deficiencies in the install of the ceiling shall be corrected prior to substantial completion.

3.05 ADJUSTMENTS AND CLEANING

A. Clean exposed surfaces of ceiling panel in accordance with manufacturer's instructions.

B. Remove and replace panels and tiles, which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes acoustical panels and exposed suspension systems with accessories and trims for ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices.

C. Seamless Acoustical Ceiling Panels.

D. Exposed Grid Suspension Systems - 15/16 inch

E. Metal Edge Moldings and Trims

F. Acoustical Sealants.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, 6 inches (150 mm) in size.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.05 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Acoustical Ceiling Panels: Full-size panels equal to 2 percent of quantity installed.
   2. Suspension-System Components: Quantity of each exposed component including decorative moldings, equal to 2 percent of quantity installed.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.08 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
   1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.09 WARRANTY

A. Provide manufacturer's 30-year limited systems warranty covering defects in materials and / or factory workmanship for ceiling panels and suspension systems.

B. Provide manufacturer's 10-year limited warranty covering sagging and warping defects caused by materials or factory workmanship for Humidity and Moisture-resistant ceiling systems.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE 7.

B. Surface-Burning Characteristics: Comply with ASTM E84 testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: Comply with ASTM E1264 for Class A materials.
   2. Smoke-Developed Index: 50 or less.

2.02 ACOUSTICAL PANELS, GENERAL

A. Low-Emitting Materials: Acoustical panel ceilings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Source Limitations:
   1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
   2. Suspension System: Obtain each type from single source from single manufacturer.

C. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.

D. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

E. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance unless otherwise indicated.
   1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E795.

F. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
   1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.03 ACOUSTICAL PANELS (ARMSTRONG - ULTIMA)

A. Basis-of-Design Product Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Armstrong World Industries, Inc.: ULTIMA 1912LEC.
   2. Architect approved equivalent.

B. Classification: Provide panels complying with ASTM E1264 for type, form, and pattern as follows:
   1. Type and Form: Type IV, mineral base with factory-applied latex paint; Form 2, water felted; with Durabrite acoustically transparent membrane. .
   2. Pattern: as indicated by manufacturer's designation.

C. Color: White.

D. Texture: Fine

E. Light Reflectance (LR): ASTM E1477; Not less than 0.88.

F. Noise Reduction Coefficient (NRC): ASTM C423; Not less than 0.75.

G. CAC: ASTM C1414; Not less than 35.

H. Articulation Class (AC): ASTM E1111/E1111M; Classified with UL label.

I. Edge/Joint Detail: Beveled Tegular.

J. Thickness: 3/4 inch (19 mm).

K. Modular Size: 24 by 24 inches (610 by 610 mm).

L. Grid size: 15/16 inch

M. Weight: 1.05 psf.

N. Insulation Value: R Factor: 2.20 (BTU Units) / 0.39 (Watt Units).

O. Fire Performance: Class A (UL)

P. Mold/Mildew Inhibitor: Front and Back of each panel shall be treated with BIOBLOCK, paint containing a biocide to inhibit / retard the growth of mold or mildew, ASTM D3273.

Q. Humidity/Sag Resistance: HUMIGUARD Plus protection.

R. VOC Emissions: GREENGUARD Gold Certified, ANSI/GBI Green Building Assessment Protocol, LEED WELL Building Standard, and UL 2818 Low Chemical Emissions UL.COM/GG.

S. Recycled Content: 87%

2.04 ACOUSTICAL PANELS (ARMSTRONG - ULTIMA)

A. Basis-of-Design Product Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Armstrong World Industries, Inc.: ULTIMA 1912LEC.
   2. Architect approved equivalent.

B. Classification: Provide panels complying with ASTM E1264 for type, form, and pattern as follows:
   1. Type and Form: Type IV, mineral base with factory-applied latex paint; Form 2, water felted; with Durabrite acoustically transparent membrane. .
   2. Pattern: as indicated by manufacturer's designation.

C. Color: Black

D. Texture: Fine

E. Light Reflectance (LR): ASTM E1477; Not less than 0.88.

F. Noise Reduction Coefficient (NRC): ASTM C423; Not less than 0.75.

G. CAC: ASTM C1414; Not less than 35.

H. Articulation Class (AC): ASTM E1111/E1111M; Classified with UL label.

I. Edge/Joint Detail: Beveled Tegular.

J. Thickness: 3/4 inch (19 mm).

K. Modular Size: 24 by 24 inches (610 by 610 mm).

L. Grid size: 15/16 inch

M. Weight: 1.05 psf.

N. Insulation Value: R Factor: 2.20 (BTU Units) / 0.39 (Watt Units).

O. Fire Performance: Class A (UL)

P. Mold/Mildew Inhibitor: Front and Back of each panel shall be treated with BIOBLOCK, paint containing a biocide to inhibit / retard the growth of mold or mildew, ASTM D3273.

Q. Humidity/Sag Resistance: HUMIGUARD Plus protection.

R. VOC Emissions: GREENGUARD Gold Certified, ANSI/GBI Green Building Assessment Protocol, LEED WELL Building Standard, and UL 2818 Low Chemical Emissions UL.COM/GG.

S. Recycled Content: 87%

2.05 SEAMLESS ACOUSTICAL CEILING PANELS (ARMSTRONG)

A. Basis-of-Design Product Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Armstrong World Industries Inc.: ACOUSTIBuilt Seamless Acoustical Ceiling System.
   2. Architect approved equivalent.

B. Classification: Provide panels complying with ASTM E1264 for type, form, and pattern as follows:
   1. Type and Form: Type IV, Form 2, Stone wool base with membrane-faced overlay and factory painted glass scrim surface.
   2. Pattern: 'G' or as indicated by manufacturer's designation.

C. Materials: Wet-formed mineral fiber.

D. Color: White.

E. Light Reflectance (LR) White Panel: ASTM E1477; Not less than 0.87.

F. Noise Reduction Coefficient (NRC) ASTM C423: Not less than 0.80.

G. Ceiling Attenuation Class (CAC) : Not less than 46.

H. R Value: 2.2

I. Edge/Joint Detail: Tapered Edge.

J. Thickness: 7/8 inch.

K. Modular Size: 48 inch by 72 inch.

L. Finish: Fine Texture spray applied finish designed for use with panels, supplied by panel manufacturer.

M. Fire Spread: ASTM E1264; Class: A

N. Dimensional Stability: HumiGuard Plus

O. Recycle Content: Post-Consumer and Pre-Consumer – up to 75%

P. Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label

Q. Life Cycle Assessment: Third Party Certified Environment Product Declaration (EPD)

R. Location: where indicated on the drawings.

2.06 METAL SUSPENSION SYSTEMS, GENERAL

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C635/C635M.
   1. High-Humidity Finish: Comply with ASTM C635/C635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

C. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
   1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
   2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.135-inch- (3.5-mm-) diameter wire.

E. Hanger Rods or Flat Hangers: 1/4 inch diameter Rod or 1 inch x 1/8 inch min. Flat Bars, Mild steel, zinc coated or protected with rust-inhibitive paint.

F. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04 inch (1 mm) thick or as indicated on the drawings, galvanized-steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch (8 mm) diameter bolts.

G. Cold Rolled Channel: 1 1/2 inch deep, 16 MSG cold rolled steel with protective zinc coating. Tie to supporting structure with 12 SWG galvanized wire ties. Install at 4'-0" o.c. maximum or as indicated on the drawings.

H. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

I. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

J. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in place. Conform to "Code of Practices for Acoustical Ceiling System Installations" by CISCA - Ceilings & Interior Systems Contractors Association.

K. Hold-Down Clips: Provide manufacturer's standard hold-down clips (Armstrong CHDC, Rockfon 490.00, or approved equivalent) spaced 24 inches (610 mm) o.c. on all cross tees. At exterior locations provide Exterior Hold Down Clips in size determined by the panel thickness (Armstrong EHDC, Rockfon 490.00, or equal).

L. Retention Clips: Provide Armstrong 414 "butterfly" style Retention Clips in Gymnasium and Activity spaces. Install as recommended by the manufacturer to secure each panel and not less than four (4) clips per panel. Note: clips shall be removable for access by twisting the wings of the clip.

2.07 METAL SUSPENSION SYSTEM - 15/16 GRID

A. Basis-of-Design Product Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Armstrong World Industries, Inc.: Prelude plus XL and Prelude XL HD.
   2. CertainTeed Corp.
   3. Chicago Metallic Corporation.

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation; with prefinished 15/16-inch (24 mm) wide metal caps on flanges.
   1. Structural Classification: Heavy-duty system.
   2. End Condition of Cross Runners: butt-edge type.
   3. Face Design: Flat, flush.
   4. Grid and Cap Material: Hot-dip galvanized steel with Aluminum cap.
   5. Cap Finish:
      a. White or Black for acoustical panel installations.
      b. Color as selected by the Architect for the 360 Painted Grid system.

2.08 METAL EDGE MOLDINGS AND TRIM

A. Basis-of-Design Product : Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Armstrong World Industries, Inc. Edge Angles, Moldings and Trims compatible with the grid specified. and Lyra Concealed Trim Kits
   2. Chicago Metallic Corporation.
   3. USG Interiors, Inc.; Subsidiary of USG Corporation.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design

requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.09 EXTRUDED MOLDINGS, TRIMS AND LIGHT SHELF WITH DRYWALL ATTACHMENT

A. Extruded Aluminum Edge Moldings and Trim: AXIOM Classis Perimeter Straight Edge Trim types and profiles indicated (). Armstrong World Industries, Contact: Ngoc-Tram Bui, ndbui@armstrong.com

B. Components: Edge trim system for suspended ceiling system, extruded aluminum alloy 6063 trim channel, 10 foot straight (12 foot straight in 2”, 4” and 6”) or curved profiles to minimum 18” (24” for 3” high) inside and outside radii for acoustical and for drywall applications.
   1. Axiom Trim Channel Straight: 12” wide face with 3/4 inch horizontal legs, straight sections with special bosses formed for attachment to the Axiom tee-bar connection clip or hanging clip; commercial quality, extruded aluminum, custom paint finish color-matched to approved sample.
      a. AX12STR - 12" Straight Perimeter Trim factory-finished to match Benjmain Moore Deep Caviar (2130-20).

C. Accessories:
   1. DW90 Clip - 90° Drywall Angle Clip used to create positive and secure angles for drywall and ceiling installations on either main beams or cross tees (attachment with 7/16" pan head screw)
   2. FrameAll HD8906 – Drywall grid main beam used to support Axiom trim and create light shelf and brace 10”, 12”, 14” or 16” height Axiom trim.
   3. Frameall XL8945P – Drywall cross tee
   4. KAM151220E - 12' Knurled Angle Molding 1-1/2" Face used to support drywall grid main beam
   5. AXTBC – Axiom T-Bar Connector Clip used to create screw-fastened connection to suspension members that intersect the trim channel
   6. AX4SPLICE – Splice with set screws, galvanized steel, unfinished, used to attach joints between sections of trim
   7. AXBTSTR – Drywall Bottom Trim Straight, extruded aluminum, 120 inches x 1-9/64 inch x 27/32 inch, used to finish edges of 5/8 inch drywall that is applied to the bottom surface of the Axiom.
      a. Color: White, Factory-finished to match Benjamin Moore Deep Caviar (2130-20), or as selected by the Architect from the manufacturer's full color offering..
   8. Length: 120 inches.

2.10 ACOUSTICAL SEALANT

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   1. Acoustical Sealant for Exposed and Concealed Joints
      a. Pecora Corporation ; AC-20 FTR Acoustical and Insulation Sealant.
      b. USG Corporation: SHEETROCK Acoustical Sealant.

B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
   1. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.03 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C636/C636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
   4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
   6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
   7. Do not attach hangers to steel deck tabs.
   8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
   9. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
   10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post-installed anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. Arrange directionally patterned acoustical panels as follows:
   a. As indicated on reflected ceiling plans.
   b. Install panels with pattern running in one direction parallel to short axis of space.
2. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
4. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions unless otherwise indicated.

3.04 FIELD QUALITY CONTROL

A. Testing Agency: a qualified testing agency to perform tests and inspections and prepare test reports.

B. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.
1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
   a. Within each test area, testing agency will select one of every 10 power-actuated fasteners and post-installed anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two post-installed anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.
   b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

C. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.05 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.02 SUMMARY

A. Section Includes:
   1. Pre-engineered perimeter transition system

1.03 REFERENCES

A. ANSI H35.1/H35.1M - American National Standard Alloy and Temper Designation Systems for Aluminum; 2024.

B. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.

C. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer’s technical data for perimeter components and each type of suspension system required.

B. Samples: Minimum 3 inch wide samples of specified component.

C. Shop Drawings: Layout and details of acoustical ceilings. Show locations of items that are to be coordinated with, or supported by the ceilings.

1.05 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide perimeter trim components and grid components by a single manufacturer.

B. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.06 SUSTAINABLE MATERIALS

A. Transparency: Manufacturers will be given preference when they provide documentation to support sustainable requirements for the following: Material ingredient transparency, Removal of Red List Ingredients per LBCV3, Life Cycle impact information, Low-Emitting Materials, and Clean Air performance.
   1. Health Product Declaration (HPD). The end use product has a published, complete Health Product Declaration with disclosure at a minimum of 1000ppm of known hazards in compliance with the Health Product Declaration Open Standard.
   2. Declare Label. The end use product has a published Declare label by the International Living Future Institute with disclosure of 100 ppm with a designation of Red List Free or Compliant (less than 1% proprietary ingredients).
   3. Low Emitting products with VOC emissions data. Preference will be given to manufacturers that can provide emissions data showing their products meet any of the following: CDPH/EHLB/Standard Method v1.2-2017; Indoor Air Quality Certified to SCS-105 v4.2-2023, Gold VOC or Clearchem
   4. Life cycle analysis. Products that have communicated lifecycle data through Environmental Product Declarations (EPDs) will be preferred.
   5. End of Life Programs/Recycling: Where applicable, manufacturers that provide the option for recycling of their products into new products at end-of-life through take-back programs will be preferred.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver perimeter trim components to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing components permit them to reach room temperature and a stabilized moisture content.

C. Handle components carefully to avoid damage.

1.08 PROJECT CONDITIONS

A. Space Enclosure:
   1. Building areas to receive ceilings shall be free of construction dust and debris. Products can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the ceiling.

1.09 WARRANTY

A. Perimeter Transition System: Submit a written warranty executed by the manufacturer, agreeing to repair or replace components that fail within the warranty period. Failures include, but are not limited to:
   1. Rusting and manufacturer’s defects

B. Warranty Period:
   1. Perimeter Transition Components: Ten (10) years from date of substantial completion.
   2. Armstrong commercial transition components, suspension systems and ceiling products have a thirty (30) year warranty when installed together and used under normal conditions.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Perimeter Transition System:
   1. Armstrong World Industries, Inc.
   2. Architect approved equivalent.

2.02 PERIMETER TRANSITION SYSTEM

A. Product/Manufacturer: Axiom Building Perimeter System; Armstrong World Industries, Inc.
   1. Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label
   2. Life Cycle Assessment: Third Party Certified Environmental Product Declaration (EPD)
   3. Indoor Air Quality Certified to SCS-105 v4.2-2023

B. System: An extruded aluminum trim used to create the transition between the perimeter and the ceiling plane. Commercial quality extruded aluminum alloy 6063 trim channel, factory finished in baked polyester paint color to match intersecting grid system. Commercial quality aluminum unfinished T-bar connection clips; galvanized steel splice plates.

C. Components:
   1. 3 Sided Axiom Building Perimeter Pocket: Aluminum pocket form with special bosses to accept T-bar connection clip and splice plate; factory finished to match approved samples; factory or field cut miters to match approved shop drawings.
      a. AXP355S – 3 Sided Perimeter Pocket, Acoustical/Drywall Transition (5 inches x 5 inches x 5 inches)
      b. AXP355SOSC – 3 Sided Perimeter Pocket, Acoustical/Drywall Transition, Outside Corner (12 inches x 5 inches x 12 inches).
      c. AXP355SISC - 3 Sided Perimeter Pocket, Acoustical/Drywall Transition, Inside Corner (12 inches x 5 inches x 12 inches).

   d. AXP355SC – 3 Sided Perimeter Pocket, Connection to Extension/Diffuser Piece (5 inches x 5 inches x 5 inches).
   e. AXP355SCOSC - 3 Sided Perimeter Pocket, Connection to Extension/Diffuser Piece, Outside Corner (12 inches x 5 inches x 12 inches).
   f. AXP355SCISC - 3 Sided Perimeter Pocket, Connection to Extension/Diffuser Piece, Inside Corner (12 inches x 5 inches x 12 inches).
2. 2 Sided Axiom Building Perimeter Pocket: Aluminum pocket form with special bosses to accept T-bar connection clip and splice plate; factory finished to match approved samples; factory or field cut miters to match approved shop drawings.
   a. AXP255S – 2 Sided Perimeter Pocket, Acoustical/Drywall Transition (5 inches x 5 inches)
   b. AXP255SOSC – 2 Sided Perimeter Pocket, Acoustical/Drywall Transition, Outside Corner (12 inches x 5 inches x 12 inches).
   c. AXP255SISC - 2 Sided Perimeter Pocket, Acoustical/Drywall Transition, Inside Corner (12 inches x 5 inches x 12 inches).
   d. AXP255SC – 2 Sided Perimeter Pocket, Connection to Extension/Diffuser Piece (5 inches x 5 inches).
   e. AXP255SCOSC - 2 Sided Perimeter Pocket, Connection to Extension/Diffuser Piece, Outside Corner (12 inches x 5 inches x 12 inches).
   f. AXP255SCISC - 2 Sided Perimeter Pocket, Connection to Extension/Diffuser Piece, Inside Corner (12 inches x 5 inches x 12 inches).
3. Axiom Building Perimeter Extensions: Pre-engineered extension components to be used to create larger pockets and ceiling elevation changes. The aluminum extension component integrates with the perimeter pocket.
   a. AXPEP4S – Axiom Perimeter Extension, 4 inch
   b. AXPEP6S – Axiom Perimeter Extension, 6 inch
   c. AXPEP8S – Axiom Perimeter Extension, 8 inch
   d. AXPEP4H – Axiom Perimeter Extension, 4inch, hook on both sides
4. Axiom Building Perimeter Diffuser Face Plates: Pre-engineered face plates to accommodate diffusing air boots supplied by others. Aluminum diffuser face plate integrates into integral hooks integrated into perimeter pocket component. Face 09120-4 plates integrate into acoustical ceiling seismic design, or drywall in the manner and width shown on architectural drawings.
   a. AXPDFPS4 – Axiom Perimeter Diffuser Face Plate; 4 inches; un-slotted.
   b. AXPDFPS4SLA – Axiom Perimeter Diffuser Face Plate; 4 inches; slotted (3/4 inch x 23 inches) - 2 slot pattern.
   c. AXPDFPS4SLB – Axiom Perimeter Diffuser Face Plate; 4 inches; slotted (2- 3/4 inch x 23 inches) - 1 slot pattern.
   d. AXPDFPSS – Axiom Perimeter Diffuser Face Plate; 7 inches; un-slotted.
   e. AXPDFP7SLAS – Axiom Perimeter Diffuser Face Plate; 7 inches; slotted (3/4 inch x 23 inches) - 2 slot pattern.
   f. AXPDFPS7SLB – Axiom Perimeter Diffuser Face Plate; 7 inches; slotted (2- 3/4 inch x 23 inches) - 1 slot pattern.
   g. AXPDFP4DT – Axiom Perimeter Diffuser Face Plate Drywall Transition; 4 inches; un-slotted.
   h. AXPDFP4DTSLA – Axiom Perimeter Diffuser Face Plate Drywall Transition; 4 inches; slotted (3/4 inch x 23 inches) - 2 slot pattern.
   i. AXPDFP4DTSLB – Axiom Perimeter Diffuser Face Plate Drywall Transition; 4 inches; slotted (2-3/4 inch x 23 inches) - 1 slot pattern.
   j. AXPDFP7DT – Axiom Perimeter Diffuser Face Plate Drywall Transition; 7 inches; un-slotted.
   k. AXPDFP7DTSLA – Axiom Perimeter Diffuser Face Plate Drywall Transition; 7 inches; slotted (3/4 inch x 23 inches) - 2 slot pattern.

   l. AXPDFP7DTSLB – Axiom Perimeter Diffuser Face Plate; 7 inches; slotted (2- 3/4 inch x 23 inches) - 1 slot pattern.
5. Axiom Building Perimeter Closure Clips: Aluminum clip to conceal pocket when shade or blind is installed.
   a. AXPCC2 – Axiom Building Perimeter Closure Clip – 2 inch
   b. AXPCC3 – Axiom Building Perimeter Closure Clip – 3 inch
6. Axiom Bottom Drywall Trim, AXBTSTR, (for 5/8 inch drywall): aluminum extrusions formed to provide taping flange for drywall finish.
7. Axiom Building Perimeter End Plate, AXCPCI: caps end of perimeter pocket.
8. T-bar Connector Clip: galvanized steel, unfinished, used to attach channel trim to suspension members.
   a. ACCLTS – for use in seismic installations with drywall, lay-in, tegular, concealed tile, and full-size Vector installations.
   b. AXVTBC – for use with cut Vector panels
9. Splice Clips: splice with set screws, galvanized steel, unfinished, used to attach joints between sections of trim.
   a. AXSPLICE – Splice with 2 set screws, used to join corners
   b. AX4SPLICE – Splice with 4 set screws, used to join straight sections
10. Foam Gasket: 10 foot long gasket, 1/2 inch x 1/2 inch, self-stick for field application, used between perimeter pocket and wall.
11. Spline, AXSPLINE: 0.175 inch diameter spline locks horizontal and vertical extension plates to box trim; helps maintain trim alignment.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer’s printed recommendations.

3.02 PREPARATION

A. Coordinate panel layout with mechanical and electrical fixtures.

3.03 INSTALLATION

A. Install suspension system and panels in accordance with manufacturer’s instructions, LA- 297427, and in compliance with ASTM C636/C636M and with the authorities having jurisdiction.

3.04 ADJUSTING AND CLEANING

A. Clean exposed surfaces of trim, edge moldings, and suspension members. Comply with manufacturer’s instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Resilient base.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches (300 mm) long.

C. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches (300 mm) long.

1.04 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Furnish not less than 10 linear feet (3 linear m) for every 300 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) nor more than 90 deg F (32 deg C).

1.06 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) nor more than 95 degrees F, in spaces to receive resilient products during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.01 THERMOPLASTIC-RUBBER BASE

A. Manufacturers:
   1. Roppe Corporation, USA
   2. Mannington Commercial
   3. Allstate Rubber Corp.
   4. Burke Mercer Flooring Products, Division of Burke Industries Inc.
   5. Johnsonite; A Tarkett Company
   6. Architect approved equivalent.

B. Product Standard: ASTM F1861, Type TP Rubber (Mannington).
   1. Group: 1 (solid, homogeneous).
   2. Style and Location:
      a. Style D, Sculptured: Provide types in areas indicated of the drawings.

1) Profile: Edge Effects (Mannington Commercial) in profiles and colors as selected by the Architect from the manufacturer's full profile and color offering.

C. Product Standard: ASTM F1861, Type TP Rubber (Mannington).
   1. Group: 1 (solid, homogeneous).
   2. Style and Location:
      a. Style D, Sculptured: Provide types in areas indicated of the drawings.
         1) Profile: Edge Effects (Mannington Commercial) in profiles and colors as selected by the Architect from the manufacturer's full profile and color offering.

D. Product Standard: ASTM F1861, Type TS (Thermoset Vulcanized Rubber).
   1. Group: 1 (solid, homogeneous).
   2. Style and Location:
      a. Style B, Cove: Provide in areas with resilient flooring.

E. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

F. Thickness: 0.125 inch.

G. Height: 6 inches or as indicated on Drawings.

H. Lengths: 120-foot Coils or in manufacturer's standard coil length.

I. Outside Corners: Preformed.

J. Inside Corners: Preformed.

K. Colors: As selected by Architect from manufacturer's full range of colors.

2.02 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

C. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are the same temperature as the space where they are to be installed.
   1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.03 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

3.04 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum horizontal surfaces thoroughly.
   3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
   1. Apply two coat(s).

E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Vinyl composition floor tile.
   2. Stage Flooring Panels.

1.03 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2025a.

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2021.

C. ASTM F970 - Standard Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading; 2022.

D. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2025.

E. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2022.

F. ISO 9001 - Quality Management Systems — Requirements; 2015.

G. Install resilient floor tiles in accordance with the recommended method of the "Tile Contractors Association of America" Handbook.

1.04 SUBMITTALS

A. Product Data: For each type of product.

B. Installation Instructions: Provide a copy of the manufacturer's installation instructions to the Owner's Construction Representative.

C. Samples: Two (2) Full-size units of each color and pattern of floor tile / plank required.

1.05 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of this Section with minimum 5 years documented experience.

B. Perform moisture tests to ascertain moisture content of concrete floors scheduled to receive resilient tile flooring and base.
   1. Concrete subfloors to receive VCT and LVT shall meet the following requirements for moisture and alkalinity levels:
      a. Moisture vapor emissions shall not exceed three (3) pounds per 1,000 square feet for 24 hours.
      b. Alkalinity levels shall be between 7.0 and 9.0 pH.
   2. Contractor shall submit to the Architect a written report on the moisture and surface alkalinity of the concrete subfloors verifying compliance with the acceptable parameters listed herein or to the more stringent requirements required by the manufacturer PRIOR to the installation of new flooring materials.

C. Resilient floor tiles and plank shall be of through-pattern construction and shall contain recycled vinyl content as a percentage of the product composition. Tiles shall be asbestos free.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
   1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered and stored under the provisions of 016500 - PRODUCT DELIVERY, STORAGE AND HANDLING.

B. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles / planks on flat surfaces.

C. Deliver materials to project site in original, unopened packages, labeled to allow easy identification.

D. Handle materials carefully to avoid chipping edges or damaging tiles in any way.

1.09 MAINTENANCE MATERIALS

A. Furnish an extra 3% of each tile type, lot, shape, size, gloss, and color in clean, clearly marked containers to the Owner for maintenance use.

1.10 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 degrees F or more than 95 deg F in spaces to receive floor tile during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. Close spaces to traffic for 48 hours after floor tile installation.

C. Install floor tile after ambient conditions have been met; testing and other finishing operations, including overhead work, dust generating activities and painting, have been completed.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM D648 or NFPA 253 by a qualified testing agency.

2.02 VINYL COMPOSITION FLOOR TILE

A. Products: Subject to compliance with requirements, provide one of the following as approved by the architect:
   1. Armstrong World Industries, Inc.; Premium Excelon Imperial Texture
   2. Architect approved equivalent..

B. Critical Radiant Flux (CRF): Minimum 0.45 watts per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.

C. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.

D. Tile Standard: ASTM F1066
   1. Class: Class 2 - Through Pattern Vinyl Tile.

E. Static Load Limit: 125 psi

F. Wearing Surface: Smooth.

G. Thickness: 1/8 inch.

H. Size: 12 inch x 12 inch.

I. Colors and Patterns: As selected by the Architect from the manufacturer's full color range.

J. Certifications: Floorscore, NSF / ANSI 332 Gold, 3rd Party Certified Industry-Wide Type III EPD.

K. Warranty: Manufacturer's Limited twenty (20) year Commercial warranty.

2.03 STAGE FLOORING

A. Water-resistant, high strength panel with tensile durability to handle heavy rolling loads and concentrated point pressures. Black color through panels.
   1. Panel Size: 4 foot by 8 foot
   2. Panel Thickness: 1/4 inch or as indicated on the drawings.
   3. Panel Texture: As selected by the Architect from the manufacturer's surface texture offering..
   4. Product Weight: 29 pounds per panel (1/4 inch thick)
   5. Manufacturer: Connor Sports, Tel.: (630) 222. 0936; E: connorsports.com/dance/connor-stage or Architect approved equivalent.
   6. Install as per manufacturers specifications, including surface preparation, panel acclimatization, handling, adhesives and sealing of edges to produce a level and near monolithic flooring system devoid of gaps, depressions fastener depressions and other surface imperfections.
   7. Provide Care and Maintenance Guide information from the manufacturer to the Owner.

2.04 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
   4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
      a. Perform anhydrous calcium chloride test according to ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lbs. of water/1000 sq. ft. in 24 hours.

b. Perform relative humidity test using in situ probes according to ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
   1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.03 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile. Provide a copy of the Manufacturer's Installation Instructions to the Owner's Construction Representative prior to the commencement of work of this Section.

B. Lay out floor 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 tile at perimeter.
   1. Lay tiles square with room axis unless indicated otherwise on the contract documents.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other non-permanent marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Set flooring in place, press with heavy roller to attain full adhesion.

J. Where applicable for certain floor tile and plank patterns, apply specially formulated acrylic grout between the tiles / planks in strict accordance with the manufacturer's recommendations.

K. Lay tile in full bond with grain in all tile running in one direction. Coordinate with Architect before installation for direction of grain.

L. Install feature strips, edge strips and floor graphics / markings as indicated. Fit joints tightly.

M. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

N. Perform the following operations immediately after completing floor tile installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

O. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

P. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
   1. Apply two coat(s).

Q. Cover floor tile until Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Epoxy floor coating system with integral cove base.

B. Surface preparation.

1.02 REFERENCES

A. ASTM D1044 - Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion by the Taber Abraser; 2019.

B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2022.

C. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

D. ASTM D3363 - Hardness Testing.

1.03 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.

B. Manufacturer's Installation Instruction: Indicate special procedures and perimeter conditions requiring special attention.

C. Manufacturer’s Material Safety Data Sheet (MSDS) for each product being used.

D. Upon request, provide 3 inch x 3 inch sample demonstrating floor color, texture and thickness and a six inch long cove base sample of the approved product selection.

1.04 QUALITY ASSURANCE

A. The Manufacturer shall have a minimum of 10 years experience in the production, sales, and technical support of epoxy and urethane industrial flooring and related materials.

B. The Applicator shall have experience in installation of the flooring system as confirmed by the manufacturer in all phases of surface preparation and application of the product specified.

C. A pre-installation conference shall be held between Applicator, General Contractor and the Owner's Representative to review and clarification of this specification, application procedure, quality control, inspection and acceptance criteria and production schedule.

D. Manufacturer of Approved System shall be single source and made in the USA.

1.05 DELIVERY, STORAGE AND HANDLING

A. All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.

B. The Applicator shall be provided with a storage area for all components. The area shall be between 60 F and 90 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.

C. Store materials for three days prior to installation in area of installation to achieve temperature stability.

D. Copies of Material Safety Data Sheets (MSDS) for all components shall be kept on site for review by the Owner's Representative or other personnel working with or around the material.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperature required by manufacturer three days prior to, during and 24 hours after installation of materials.

1.07 WARRANTY

A. Provide 5-year manufacturer's warranty.

B. Warranty: Include coverage against flooring delamination from substrate and degradation of surface finish.

1.08 MAINTENANCE DATA

A. Submit maintenance data.

B. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface and suggested schedule for cleaning.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Dur-A-Quartz, Epoxy-based seamless flooring system as manufactured by Dur-A-Flex, Inc., 95 Goodwin Street, East Hartford, CT 06108, Phone: (860) 528-9838, Fax: (860) 528-2802

B. Herculan IG as manufactured by Action Floor Systems, LLC.

2.02 MATERIALS

A. Primer: Dur-A-Flex, Inc, Dur-A-Glaze #4 WB resin and hardener.

1. Percent Solids	56 %	
2. VOC	2 g/L	
3. Bond Strength to Concrete ASTM D 4541		550 psi, substrates fails
4. Hardness, ASTM D 3363	3H	
5. Elongation, ASTM D 2370	9 %	
6. Flexibility (1/4: Cylindrical mandrel), ASTM D 1737		Pass
7. Impact Resistance, MIL D-2794	>160	
8. Abrasion Resistance ASTM D 4060, CS17 wheel, 1,000 g		30 mg loss

B. Broadcast and Grout Floor Coating: 100% solids epoxy resin.

1. VOC	3.8 g/L	
2. Compressive Strength, ASTM D 695	17,500 psi	
3. Tensile Strength, ASTM D 638	2,100 psi	
4. Flexural Strength, ASTM D 790	5,100 psi	
5. Abrasion Resistance, ASTM D 4060		
C-10 Wheel, 1,000 gm load, 1,000 cycles		29 mg loss
6. Flame Spread/NFPA-101, ASTM E 84	Class A	
7. Impact Resistance MIL D-24613	0.0007 inches, no cracking	
or delamination		
8. Water Absorption. MIL D-24613	Nil	
9. Pot life @ 70 F	20 minutes	

C. Aggregate: The quartz aggregate shall be Dur-A-Flex, Inc. Q-28 or Q-11 colored quartz aggregate, ASTM D451, manufactured by 3M Company or approved equal; color as selected by Architect from manufacturer's full line.

D. Aggregate: Acrylic color chips. Colors to be selected by the Architect from the manufacturer's full color offering. Chip size shall be as selected by the Architect.

E. Grout Coat: Dur-A-Flex, Inc. Dur-A-Glaze #4 resin and Water Clear hardener.

F. Top Coat - Dur-A-Flex Poly-Thane 2 or Armor Top (Sherwin Williams GP4638 Urethane Seal Coat for the Sherwin Williams system).

1. Percent Solids	95 %		
2. VOC	0 g/L		
3. Tensile Strength, ASTM D 2370		7,000 psi	
4. Adhesion, ASTM 4541		Substrate Failure	
5. Hardness, ASTM D 3363	4H		
6. 600 Gloss ASTM D 523	70		
7. Abrasion Resistance, ASTM D4060		Gloss	Satin
CS 17 wheel (1,000 g load) 1,000 cycles		without grit	8 mg loss/grit
		10	42 mg loss

8.	Pot Life, 70 F, 50% RH	2 Hours
9.	Full Chemical Resistance	7 days

G. Patch Materials
   1. Shallow Fill and Patching: Use Dur-A-Flex, Inc. Dur-A-Glaze # 4 Cove-Rez.
   2. Deep Fill and Sloping Material (over ¼ inch): Use Dur-A-Flex, Inc. Dur-A-Crete

2.03 ACCESSORIES

A. Primers and Fillers: Waterproof; types recommended by flooring manufacturer.

B. Expansion Joints/Joint Fillers: Types recommended by flooring manufacturer for specific application.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas and conditions, with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.

B. Verify that surfaces are smooth and flat with maximum variation of 1/4 inch in 10 feet, and are ready to receive work.

C. Verify concrete floors have cured a minimum of 28 days, are dry to a maximum moisture content of 7 percent, and exhibit negative alkalinity, carbonization or dusting.

3.02 PREPARATION

A. New and existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.

B. Moisture Testing: Perform tests recommended by manufacturer and as follows.
   1. Perform anhydrous calcium chloride test ASTM F1869. Application will proceed only when the vapor/moisture emission rates from the slab is less than and not higher than 20 lbs/1,000 sf/24 hrs.
   2. Perform relative humidity test using is situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
   3. If the relative humidity exceeds 75% then Dur-A-Flex, Inc Dur-A-Glaze MVP Primer moisture mitigation system must be installed prior to resinous flooring installation. Slab-on grade substrates without a vapor barrier may also require the moisture mitigation system.

C. There shall be no visible moisture present on the surface at the time of application of the system. Compressed oil-free air and/or a light passing of a propane torch may be used to dry the substrate.

D. Mechanical surface preparation
   1. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 4-5 as described by the International Concrete Repair Institute.
   2. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
   3. Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum 1/4 inch key cut shall be made to properly seat the system, providing a smooth transition between areas. The detail cut shall also apply to drain perimeters and expansion joint edges.
   4. Cracks and joints (non-moving) greater than 1/8 inch wide are to be chiseled or chipped-out and repaired per manufacturer's recommendations.

E. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufactures recommendations.

F. Vacuum clean substrate.

G. Apply primer as per manufacturer's recommendations.

3.03 INSTALLATION FLOORING

A. Apply floor coating system in accordance with manufacturer's instructions. Form integral ¼ inch radius cove base 6 inches high with same materials as floor coating. Apply four finish coats minimum and spread aggregate uniformly in accordance with the manufacturer's instructions.

B. The system shall be applied in seven distinct steps as listed below:
   1. Substrate preparation
   2. Priming
   3. First broadcast coat application with first aggregate broadcast
   4. Second broadcast coat with second aggregate broadcast
   5. Grout coat application, sand floor (if required)
   6. First topcoat application
   7. Second topcoat application

C. Install expansion joints and/or joint filler as per manufacturer's instructions.

D. The finish floor will have a nominal thickness of 1/8 inch.

3.04 PROTECTION OF FINISHED WORK

A. Protect finished work until work is complete. Cure flooring material in compliance with manufacturer’s directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.

B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.

C. Barricade area to protect flooring until fully cured.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes: .
   1. Entrance Mat Carpet Tile.

1.03 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
      a. Review delivery, storage, and handling procedures.
      b. Review ambient conditions and ventilation procedures.
      c. Review subfloor preparation procedures.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
   2. Include installation recommendations for each type of substrate.

B. Shop Drawings: Show the following:
   1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
   2. Carpet tile type, color, and dye lot.
   3. Type of subfloor.
   4. Type of installation.
   5. Pattern of installation.
   6. Pattern type, location, and direction.
   7. Pile direction.
   8. Type, color, and location of insets and borders.
   9. Type, color, and location of edge, transition, and other accessory strips.
   10. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
   1. Carpet Tile: Full-size Sample.
   2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch (300-mm) long Samples.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

1.06 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
   1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
   2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 10 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.08 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.

C. Source Quality: Obtain flooring product materials from a single manufacturer.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

B. Ordering: Comply with the manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

E. Comply with the manufacturer’s recommendation for the acclimation of all materials in the space where they will be installed for at least 48 hours prior to the installation unless longer conditioning periods are required by the manufacturer.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.

B. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
   1. Testing Results: Conduct and document pre-installation testing as specified by manufacturer in accordance with the latest version of the specified test methods.
      a. Substrate Porosity Testing: ASTM F 3131 – Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.
      b. pH testing: ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
      c. In-situ Relative Humidity Testing: ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
      d. Calcium Chloride Testing: ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emissions Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
      e. Surface Moisture Testing: ASTM F 2659 – Standard Guide for Preliminary Evaluation of Comparative Moisture Condition of Concrete, Gypsum Cement and other Floor Slabs and Screeds Using a Non- Destructive Electronic Moisture Meter.
      f. Bond Testing: Conduct testing and document results in accordance with the manufacturer’s recommendations.

C. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, loss of tuft bind strength, loss of face fiber, and delamination.
   2. Warranty Periods: (Forbo Flotex Modular)

a. Twenty (20) year limited manufacturer warranty.
b. Two (2) year limited installer warranty.

PART 2 - PRODUCTS

2.01 CARPET TILE - FORBO "FLOTEX MODULAR" CARPET FLOORING CPT1

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Forbo " FLOTEX MODULAR"

B. Color: As selected by Architect from manufacturer's full range.

C. Pattern: As selected by the Architect from the manufacturers full pattern offering.

D. Fiber Content: Flocked high performance carpet tile with a 100% nylon type 6.6 wear layer with an intermediate fiberglass layer and a recycled vinyl cushioned backing.

E. Gauge: 0.21 inch (5.3 mm).

F. Tile Size: 19.7 inches X 19.7 inches (50cm x 50 cm).

G. Tile Weight: 1.1 pounds per square foot.

H. Texture Appearance Retention Rating (TARR): Severe.

I. Primary Backing/Backcoating: Recycled Vinyl cushioned backing

J. Applied Soil-Resistance Treatment: Manufacturer's standard material.

K. Adhesive: As recommended by the manufacturer.

L. General Performance Characteristics:
   1. Use Classification: Class 33 Heavy Commercial Use.
   2. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm. - Class I
   3. Tuft Bind: Not less than 10 lbf (45 N) according to ASTM D 1335.
   4. Delamination: Not less than 4 lbf/in. (18 N/mm) according to ASTM D 3936.
   5. Dimensional Tolerance: Within 1/32 inch (0.8 mm) of specified size dimensions, as determined by physical measurement.
   6. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
   7. Indoor Air Quality: CRI Green Label Plus.
   8. Methenamine Pill Test (CPSC FF-1-70 or ASTM D 2859): Self Extinguishing.
   9. Smoke Density (NFPA 258 or ASTM E662): less than 450.
   10. Colorfastness to Crocking: Slight Color change when tested according to AATCC 165.
   11. Colorfastness to Light: No color change according to AATCC 16, Option 3.
   12. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.
   13. Electrostatic Propensity: Less than 3.0 kV according to AATCC 134.
   14. Emissions: Provide carpet tile that complies with testing and product requirements of CRI's "Green Label Plus" program. CDPH 01350 compliant for VOC emissions and indoor air quality..
   15. Sound Reduction: ASTM E492, IIC 59. ISO 354 Sound Absorption: NRC= 0.10.
   16. Slip Resistance: ASTM D2047; >0.5 for flat surfaces.

2.02 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints. Colors and patterns as selected by the Architect from the manufacturers full color and pattern offering. See drawings for details.

C. Resilient Edge Strips: Strips shall be homogeneous vinyl or rubber composition with a tapered or bull nose edge no less than 1” wide, colored to match flooring or as selected by Architect from standard colors available. See drawings for details.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
   2. Subfloor finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" for slabs receiving carpet tile.
   3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Surface Preparation:
   1. General: Prepare substrate in accordance with manufacturer's recommendations and ASTM industry standards. Work shall not proceed until all unsatisfactory conditions are corrected to acceptable conditions to the Owner and Architect.
   2. Substrate: Substrates to receive flooring must be structurally sound, rigid, smooth, flat, clean, and permanently dry. The substrates must be free of all foreign materials including, but not limited to, dust, solvent, paint, wax, oils, grease, residual adhesive, adhesive removers, film-forming curing compounds, silicate penetrating curing compounds, sealing, hardening or parting compounds, alkaline salts, excessive carbonation or laitance, mold, mildew, and other foreign materials that might affect the rate of moisture dissipation from the concrete, the adhesion of flooring to the concrete or cause a discoloration of the flooring from below.
   3. Concrete Substrate: Concrete substrates shall be cured per the concrete manufacturer’s recommendations. They must have a minimum compressive strength of 3,000 psi and a minimum dry density of 150 pounds per cubic foot.
      a. Refer to Division 03 Concrete Sections for cast-in-place concrete, concrete toppings, and cementitious underlayments.
      b. Reference Standard: Comply with the latest version of ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

E. Substrate Testing: In order to ensure that the moisture condition of concrete substrates is within acceptable limits, it is essential that moisture testing be conducted and documented on ALL concrete substrates regardless of age or grade level, including those where resilient flooring has

already been installed. Moisture testing should only be conducted once a stable, conditioned environment has been established in accordance with the latest version of the specified test methods. All other testing types shall be conducted on all substrate types. A diagram of the area showing the location and results of each test should be submitted to the Architect, General Contractor or End User. If at the time of testing the test results exceed the limitations set forth by the flooring manufacturer, the installation must not proceed until the problem has been corrected. The Contractor responsible for the substrate shall be responsible for the costs associated with analysis of the substrate and subsequent remediation requirements.

1. Surface Moisture Testing: ASTM F2659 – Standard Guide for Preliminary Evaluation of Comparative Moisture Condition of Concrete, Gypsum Cement and other Floor Slabs and Screeds Using a Non- Destructive Electronic Moisture Meter.
2. In-situ Relative Humidity Testing: ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
    a. Conduct three (3) tests for the first 1,000 square feet (100 square meters) and at least one additional test for each additional 1,000 square feet (100 square meters).
3. Calcium Chloride Testing: ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emissions Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
    a. Conduct three (3) tests for the first 1,000 square feet (100 square meters) and at least one additional test for each additional 1,000 square feet (100 square meters).
4. Substrate Porosity Testing: ASTM F3131 – Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.
    a. Conduct testing in accordance with the manufacturer’s recommendations in various locations throughout the area where flooring is to be installed. Although the number of tests required may vary, enough tests should be performed to allow an evaluation of the entire area where material will be installed.
    b. Water should penetrate into the substrate within 5 – 10 minutes to be considered acceptable. If water penetrates too rapidly or too slowly, adjustments to the substrate must be made to provide the proper surface profile. Substrates determined to be overly porous, dusty or generally insufficient may need to be primed using a primer according to the manufacturer’s recommendations to regulate the porosity level of the substrate.
5. pH testing: ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
    a. Conduct testing at each calcium chloride test location as the calcium chloride tests are removed.
6. Bond Testing
    a. Conduct testing in accordance with the manufacturer’s recommendations in various locations throughout the area where flooring is to be installed. Although the number of tests required may vary, enough tests should be performed to allow an evaluation of the entire area where material will be installed.

F. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.03 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer. Free lay; install carpet tiles without additional adhesive - pressure sensitive adhesive.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use non-permanent, nonstaining marking device.

G. Do not install resilient flooring over expansion joints. Use expansion joint covers manufactured for use with resilient flooring. Refer to other specification sections for expansion joint covers.

H. Adhere resilient flooring to substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed installation.
   1. Use adhesive applied to the substrate in compliance with the flooring manufacturer's recommendations, including those for proper spreading of the adhesive, adhesive missing and adhesive open and working times.

I. Immediately roll the flooring in all directions using a 100 lb. roller to ensure proper adhesive transfer. Additional rolling is required during adhesive setup to ensure that the material is flat and fully adhered. The use of a three-section wall roller or steel seam roller is required at walls, under toe kicks or anywhere the full weight of a 100 lb. roller cannot access or be applied.

J. Install pattern(s) as indicated on the drawings, parallel to walls and borders.

3.04 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:
   1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
   2. Remove yarns that protrude from carpet tile surface.
   3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection and cleaning methods indicated or recommended in writing by carpet tile manufacturer.

D. Remove and legally dispose of protective covering at time of Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general conditions of contract, including general and supplementary conditions and Division 1 specification sections, apply to work of this section.

1.02 SUMMARY

A. Sections include
   1. Acoustical Metal Wall Panels
   2. Mounting hardware and materials

1.03 REFERENCES

A. ASTM C423 “Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method”

B. ASTM E84 “Standard Test Method for Surface Burning Characteristics of Building Materials”

1.04 SUBMITTALS

A. Product Data: Manufacturer’s technical literature and installation instructions

B. Samples: Minimum 8-3/8" x 11-1/2" samples of specified acoustical panel; representative samples of installation devices and accessories.

C. Certifications: Manufacturer’s certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards

1.05 QUALITY ASSURANCE

A. Single Source Responsibility: To ensure proper interface and color match, all acoustical panel units and grid components shall be produced or supplied by a single manufacturer. Materials supplied by more than one manufacturer are not permissible.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer’s unopened packages; suitably store to protect against exposure to moisture, sunlight, surface contamination, and other unacceptable conditions.

B. Handle components to prevent panel edge damage or any other damage to components.

1.07 PROJECT CONDITIONS

A. Environmental Requirements at installation
   1. The building shall be enclosed, the air conditioning system shall be operating with proper filters in place and the proper temperature and humidity conditions shall be stabilized before, during and following installation until Substantial Completion. Building areas to receive ceilings shall be free of construction dust and debris.
   2. Coordination: Coordinate acoustical ceilings work with installers of related work including, but not necessarily limited to, building insulation, gypsum drywall, mechanical systems and electrical systems.

B. Dimensional Stability:
   1. MetalWorks Acoustical Wall Panels: Installation shall be carried out in temperature conditions up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating.

1.08 WARRANTY (LIMITED)

A. Acoustical Panels: Submit a written warranty executed by the manufacturer, agreeing to repair or replacement of acoustical panels that fail within the warranty period. Failures include, but are not necessarily limited to:
   1. MetalWorks Acoustical Wall Panels: Rusting and manufacturer’s defects

B. Warranty period for MetalWorks Acoustical Wall Panels is ONE (1) year from date of Substantial Completion.

C. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents. Set out in full.

1.09 MAINTENANCE

A. Extra Materials: Deliver and furnish extra material to owner, as described below, to match products installed. Package with protective covering for storage and identify with appropriate labels.
   1. MetalWorks Acoustical Wall Panels: Furnish quantity of full sizefull-size units equal to 5% of the amount installed.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. The materials are either manufactured by or for Armstrong World Industries, Inc. (the “Manufacturer”)

2.02 MATERIALS

A. Suspension System: Type-1 Product: Armstrong MetalWorks WH1000 and WH1100 Suspension System by Armstrong World Industries, rep: Ngoc-Tram Bui, ndbui@armstrong.com

B. Components: BPM315.600 C-Wall Profile sections shall be commercial-quality galvanized steel coating. Exposed surfaces chemically cleansed.

2.03 MANUFACTURER

A. The materials are either manufactured by or for Armstrong World Industries, Inc. (the “Manufacturer”).

B. Architect approved equivalent.

C. Substitutions: See Section(s) 012500 - PRODUCT SUBSTITUTION PROCEDURES and 016100 - BASIC PRODUCT REQUIREMENTS

2.04 MATERIALS

A. Metal Wall Panel: Type AWP-1
   1. Type: Armstrong MetalWorks Wall Panels – Slotted Panel with Black Acoustical Fleece Backing

B. Performance Characteristics:
   1. Sound Control:
      a. Noise Reduction Coefficient: NRC of .60 inch (15.24 mm) compliance with ASTM C423 with factory-adhered black acoustical fleece
   2. Flame Spread
      a. Less than 25, per ASTM E84
      b. Class A, per ASTM E1264
   3. Light Reflectance:
      a. Dependent upon color and perforation selected, per ASTM E1477

C. Surface Texture, Substrate, Size and Edges:
   1. Surface Texture: Smooth or as selected by the Architect from the manufacturer's full offering..
   2. Pattern Perforation Patterns: M1 (unperforated) or as selected by the Architect from the manufacturer's full offering.
   3. Surface Finish: Scrubbable, architectural-quality, electrostatically applied polyester powder coat paint applied to entire panel after forming (post coat)..
   4. Color: Factory-finished to match RAL 9018 and RAL 5002.
   5. Substrate: Panels shall have manufacturer's standard, .063 aluminum substrate.
   6. Size(s): 32 inch by 40 inch panels and as indicated on the drawings.
   7. Edge Detail: All edges returned, spacer buttons installed to create 5mm reveals. Two adjacent sides notched for installation on WH1000 wall rail.
   8. Accessories: WH1000 and WH100 wall rails, 5mm spacer buttons.

PART 3 EXECUTION

3.01 PREPARATION

A. Examine construction and conditions under which system will be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Installation to be performed by installer familiar with product and installation methods.

B. Install acoustical wall panels in locations indicated with vertical surfaces and edges plumb, top edges
   1. level, and in alignment with other panels, scribed to fit adjoining work accurately at borders and at penetrations.

C. Comply with manufacturer's printed instructions for installation of panels using type of mounting accessories indicated or, if none indicated, as recommended by manufacturer.

D. Adhesively mounted clips are not acceptable.

E. Remove and replace panels which are damaged and are unacceptable to Architect.

F. Panels shall be spot cleaned to remove any finger marks or soil.

G. Panels with certain product finishes or characteristics, e.g., Sequels™ or standard WHA, SIA, MYA painted are part of our MetalWorks™ FASTPeel ™ Panel which come standard with our easier-to-remove protective film.

3.03 ADJUSTING AND CLEANING

A. Upon completion of work, remove all rubbish and excess material resulting from the work of this Section from building and leave areas in clean satisfactory condition.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sound-absorbing panels and modules.

B. Mounting accessories.

1.02 REFERENCE STANDARDS

A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2022.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

C. ASTM E795 - Standard Practices for Mounting Test Specimens during Sound Absorption Tests; 2023.

1.03 SUBMITTALS

A. See Section 013300 - 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. Test Reports: Certified test data from an independent test agency verifying that panels meet specified requirements for acoustical and fire performance.

E. Manufacturer's Qualification Statement.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016100 - BASIC PRODUCT REQUIREMENTS, for additional provisions.
   2. Extra Panels: Quantity equal to 5 percent of total installed, but not less than one carton of each type. One Carton contains four panels.
      a. Furnish Extra Materials from same production run to verify run for color.
      b. Package replacement materials with protective covering, identified with appropriate labels.

1.04 QUALITY ASSURANCE

A. Installer's Qualifications: Firm with not less than 5 years experience in installation of products similar in complexity to those required for this Project, including specific requirements indicated.
   1. Successfully completed not less than 5 comparable scale projects.

B. Manufacturer Qualifications: Company with not less than five years of experience in manufacturing acoustical products similar to those specified.

C. Single Source Responsibility: Obtain the following units for entire Project from a single manufacturer.

1.05 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. Storage and Protection: Comply with manufacturer's recommendations.
   1. Store products in a cool, dry place out of direct sunlight.
   2. Protect from elements and from damage.

C. Protect edges from damage.

1.06 WARRANTY

A. Provide executed copy of the manufacturer's five (5) year Warranty covering manufacturing defects, workmanship, color irregularities, shipping damage and other instances noted in the Warranty to the Owner as part of Project Closeout documentation.

PART 2 PRODUCTS

2.01 FELT (PET) BASED SOUND ABSORBING MODULES (AF1 - AF4)

A. Manufacturers:
   1. Turf Design
   2. Architect approved equivalent.
   3. Substitutions: See SECTION 012500 - PRODUCT SUBSTITUTION PROCEDURES and SECTION 016100 - BASIC PRODUCT REQUIREMENTS

B. General
   1. Prefinished, factory assembled fabric-covered modules.
   2. Acoustic Foam with PET Fabric covering.
   3. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.

C. PET Fabric-Covered Acoustical Tangram Tiles for Walls:
   1. Panel Core: Manufacturer's standard rigid or semi-rigid fiberglass core.
   2. Facing: 0.354 inches (9mm) impact-resistant and tackable PET surface laminated to core.
   3. Noise Reduction Coefficient (NRC): 0.25 (9mm Tile) when tested in accordance with ASTM C423 for Type A mounting per ASTM E795.
   4. Modules Size: as indicated on the drawings.
   5. Modules Shape: Tangram (Triangles) or as indicated on the drawings
   6. Panel Thickness: 0.354 inches (9mm) and as indicated on the drawings.
   7. Corners: Square.
   8. Edge Configuration: 45 degree carve or as indicated on the drawings
   9. Fabric: PET.
   10. Color: As selected by Architect/Engineer from manufacturer's full range.
   11. Patterns: Where fabric with directional or repeating patterns or fabric with directional weave is used, mark for installation in same direction.
   12. Mounting Method: Direct applied with adhesive.

2.02 ALURATONE WALL PANELS (AP1 - AP2)

A. (AP1) System 700 PERFection, Series acoustic ceiling panels are provided with precision face perforations. Aluratone PERFection will have precision face perforations. The back of the 3/4 inch (19.05 mm) core is drilled so that the intersection of the face holes and back holes will create openings through the panel. Acoustical absorptive black backing is applied in the factory. Acoustical performance is dependent on project design, application, mounting method, and additional sound absorbent material. Acoustical performance can be achieved up to NRC-0.90.
   1. Panel Size: As indicated on the drawings
   2. Face Profile:
      a. Aluratone 750 is manufactured with 0.022 inch (0.56 mm) perforations on staggered centers. Substrate is Back-Bored to allow for increased open area and greater sound attenuation while minimizing visible face machining.
   3. Trim and Border Treatment: Provide end caps, junction trims, or edgebanding as indicated.
   4. Veneer Species:
      a. White Oak
   5. Finish:
      a. Satin Clear / stain to match architect sample

B. (AP2) Aluratone 900 Series acoustic WALL panels are provided with vertical grooved face scoring. The back of the 3/4 inch (19.05 mm) core is drilled so that the intersection of the face grooves and back holes will create openings through the panel. Acoustical absorptive black backing is applied in the factory. Acoustical performance is dependent on project design, application, mounting method, and additional sound absorbent material. Acoustical performance can be achieved up to NRC-0.90.
   1. Panel Size: As indicated on the drawings

2. Grooved Scoring:
   a. Aluratone 950 provided with vertical "V" grooved face scoring 0.079 inch (2.01 mm) wide on 0.197 inch (5 mm) centers.
3. Trim and Border Treatment: Provide end caps, junction trims, or edgebanding as indicated.
4. Veneer Species:
   a. White Oak
5. Finish:
   a. Satin Clear / match architect sample

2.03 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.

B. Factory-applied finishes on wood veneer panels to be uniform, smooth, and without blemishes.

2.04 ACCESSORIES

A. Back-Mounting Accessories: Manufacturer's standard accessories for concealed support, designed to allow panel removal, and as follows:
   1. Two-part clip and base-support bracket system; brackets designed to support full weight of panels and clips designed for lateral support, with one part mechanically attached to back of panel and the other attached to substrate (supplied by the manufacturer).

B. Fixing Clips: Manufacturers standard for application as indicated.

C. Furring Strips: 1 by 4 inch wood furring (25 by 100 mm).

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect installation area and conditions under which work is to be performed for compliance with all manufacturer’s environmental requirements. All wet work in the installation area must be complete, cured and dry prior to installation. Do not proceed until all unsatisfactory conditions have been corrected.

B. Examine substrates for conditions detrimental to installation of acoustical units. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Provide installation by a qualified contractor with 2 years experience in the installation of acoustic treatment or acoustic ceilings. The firm must demonstrate successful experience installing materials of similar type and quality of those required for this project.

B. Install acoustical units in locations as indicated, following manufacturer's installation instructions.

C. Confirm all field dimensions are coordinated with approved shop drawings.

D. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.

E. Furring Mounted Wood Veneer Panels:
   1. Install furring strip along meeting edges of adjacent panels to ensure they are attached to same furring strip along abutted edge; 24 inch (610 mm) on center, maximum.
   2. Install acoustic back-up material between furring as required for application.
   3. Adhere first panel from edge to furring strip, and attach subsequent panels using fixing clips.

F. 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.

3.03 CLEANING

A. Clean fabric facing upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

3.04 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 Architect/Engineer.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates.
   1. Concrete.
   2. Concrete Masonry Units.
   3. Steel.
   4. Galvanized metal.
   5. Gypsum board.
   6. Wood.
   7. Aluminum.

1.03 DEFINITIONS

A. Flat: Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.

B. Matte: Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

C. Eggshell: Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

D. Satin: Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.

E. Semi-Gloss: Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

F. Gloss: Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.

G. High Gloss: Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.
   1. Product List: For each product indicated, include the following:
   2. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
   3. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
   4. VOC content.

1.05 CLOSEOUT SUBMITTALS

A. Coating Maintenance manual: Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams “Custodian Project Color and Product Information report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

B. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams “Custodian Project Color and Product Information report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.07 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
      a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
      b. Other Items: Architect will designate items or areas required.
   2. Final approval of color selections will be based on mockups.
      a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

B. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer’s label with the following information:
   1. Product name and type (description).
   2. Batch date.
   3. Color number.
   4. VOC content.
   5. Environmental handling requirements.
   6. Surface preparation requirements.
   7. Application instructions.

1.09 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Lead Paint: It is not expected that lead paint will be encountered in the Work. If Lead paint is encountered, refer to OSHA "Lead In Construction Standard". Additional regulations may apply if the project is considered EPA defined Target Housing or Child Occupied Facility.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. 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. Benjamin Moore & Co.

2. PPG Architectural Finishes, Inc.
3. Sherwin-Williams Company.

2.02 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:
1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anti-corrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

D. Colors: As selected by Architect from manufacturer's full range.
1. 30 percent of surface area will be painted with deep tones.

2.03 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior: MPI #4.
1. Benjamin Moore - Super Spec - Int/Ext High-Build Block Filler - 206/K206 (75-100 sq. ft. / gal - 4.2 mdf per coat), VOC 55 g/l, CHPS (E3)
2. Sherwin-Williams - PrepRite Int/Ext Block Filler, B25W25, at 75-125 sq. ft. per gal. (E3)
3. Architect approved equivalent.

2.04 PRIMERS/SEALERS

A. Primer Sealer, Interior, Institutional Low Odor/VOC: MPI #149.
1. Benjamin Moore - Ultra Spec 500 Latex Primer N534 +(0 g/l), X-Green (E3)
2. Sherwin-Williams - ProMar 200 Zero - Interior Latex Primer - B28W02600/B28WQ2600 (E3)
3. PPG - Speehide Zero Interior Zero VOC - #6-4900XI -(E3)

B. Primer, Alkyd, Anti-Corrosive, for Metal:
1. Benjamin Moore - Super Spec Alkyd Metal Primer P06, 1.9 mdf, VOC - 313 (E2)
2. Sherwin-Williams - Protective & Marine - Kem Bond HS - B50WZ4 (E2)
3. Rustoleum - High Performance - 7400 System - #2082402 (E2)
4. Architect approved equivalent.

C. Primer, Alkyd, Quick Dry, for Metal:
1. Benjamin Moore -Corotech Universal Metal Primer V131, 2.1 mdf, 333 g/l.
2. Sherwin-Williams - Protective & Marine - Kem Bond HS Universal Alkyd Primer - B50WZ0004 (E3)
3. Architect approved equivalent.

D. Primer, Galvanized, Water Based:
1. Benjamin Moore Super Spec HP Acrylic Metal Primer P04/KP04.

2. Sherwin Williams - Pro Industrial - Pro-Cryl Universal Primer - B66W310 (E2)
3. Architect approved equivalent.

2.05 WATER-BASED PAINTS

A. Latex, Interior, Flat, (Gloss Level 1): MPI #53
   1. Benjamin Moore - Eco Spec WB Interior Latex Flat Finish N373/F373 (E3)
   2. Sherwin-Williams - Solo - Interior/Exterior 100% Acrylic Flat - A74W00051 (E3)
   3. PPG - Speedhide - Interior Flat Latex - #6-70 (E3).
   4. Architect approved equivalent.

B. Latex, Interior, (Gloss Level 4): (Pearl / Satin / Low Lustre)
   1. Benjamin Moore - Ultra Spec 500 Latex Semi Gloss N539 (0 g/l), 43 X-Green (E3).
   2. Sherwin-Williams - ProMar 200 Zero VOC - Interior Latex Semi-Gloss, B31-2600 Series - (E3).
   3. Architect approved equivalent.

C. Latex, Interior, Institutional Low Odor/VOC, Flat (Gloss Level 1):
   1. Benjamin Moore - Ultra Spec 500 Latex Eggshell N538 (0 g/l), MPI #143 X-Green, CHPS Certified (E3).
   2. Sherwin-Williams - Harmony - Interior Acrylic Latex Flat - B05W01051 (E3)
   3. Architect approved equivalent.

D. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 3):
   1. Benjamin Moore - Ultra Spec500 Latex Eggshell N538 (0 g/l), MPI # 145 X-Green, CHPS Certified (E3).
   2. Sherwin Williams Promar 200 Zero VOC - Interior Latex Flat - #B30WO2651/B30WQ2651 (E3).
   3. PPG Speedhide Zero - Interior Zero VOC Latex Flat - #6-4110XI (E3).

2.06 SOLVENT-BASED PAINTS

A. Epoxy Primer: MPI #212
   1. Sherwin-Williams - Protective & Marine - ArmorSeal 33 Epoxy Primer - B58AQ33/B60VQ33 (E3)
   2. Architect approved equivalent.

B. Alkyd, Quick Dry, Semi-Gloss (Gloss Level 5):
   1. Corotech Alkyd Enamel Semi-Gloss V231, 2.0 - 2.5 mdf, 389 g/l.
   2. Architect approved equivalent.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
   1. Report in writing conditions that may affect application, appearance, or performance of paint.

B. Substrate Conditions:
   1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
      a. Concrete: 12 percent.
      b. Masonry (Clay and CMU): 12 percent.
      c. Gypsum Board: 12 percent.
   2. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.
   1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
   1. Concrete Floors: Remove oil, dust, grease, dirt and other foreign materials. Comply with SSPC-SP-13/NACE 6 or ICRI 03732.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
   1. SSPC-SP 3, "Power Tool Cleaning."

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
   1. SSPC-SP 2, "Hand Tool Cleaning."
   2. SSPC-SP 3, "Power Tool Cleaning."
   3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
   4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections and abraded areas of shop paint and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop primed surfaces.

H. Galvanized Metal Surfaces: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:
   1. Scrape and clean knots and apply coat of knot sealer before applying primer.
   2. Sand surfaces that will be exposed to view and dust off.
   3. Prime edges, ends, faces, undersides and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt and other foreign material that might impair the bond of paints to substrates.

3.03 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
   1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Unless otherwise specified or noted, paint all “unfinished” conduits, piping, hangers, ductwork and other mechanical and electrical equipment with color and texture to match adjacent surfaces, in the following areas:
   a. where exposed-to-view in all exterior and interior areas.
   b. in all interior high humidity interior areas.
   c. in all boiler room, mechanical and electrical rooms.
2. In unfinished areas leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
3. Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
4. Do not paint over nameplates.
5. Paint the inside of all ductwork where visible behind louvers, grilles and diffusers for a minimum of 460 mm (18”) or beyond sight line, whichever is greater, with primer and one coat of matt black (non-reflecting) paint.
6. Paint the inside of light valances gloss white.
7. Paint disconnect switches for fire alarm system and exit light systems in red enamel.
8. Paint red or band all fire protection piping and sprinkler lines in accordance with mechanical specification requirements and the AHJ. Keep sprinkler heads free of paint.
9. Paint yellow or band all natural gas piping in accordance with mechanical specification requirements and the AHJ.
10. Backprime and paint face and edges of plywood service panels for telephone and electrical equipment before installation to match adjacent wall surface. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
    a. Uninsulated plastic piping.
    b. Pipe hangers and supports.
    c. Metal conduit.
    d. Plastic conduit.
    e. Tanks that do not have factory-applied final finishes.
    f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material. Coordinate the installation of required piping labels with the installing contractor in order to schedule painting prior to application of labels.
11. Paint the following work where exposed in occupied spaces:
    a. Equipment, including panelboards.

b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items as directed by Architect.

12. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.04 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.05 PROTECTION

A. Protect all exterior surfaces and areas, including landscaping, walks, drives, all adjacent building surfaces (including glass, aluminum surfaces, etc.) and equipment and any labels and signage from painting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means and make good any damage caused by failure to provide such protection.

B. Protect all interior surfaces and areas, including glass, aluminum surfaces, etc. and equipment and any labels and signage from painting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means and make good any damage caused by failure to provide such protection.

C. Erect barriers or screens and post signs to warn of or limit or direct traffic away or around work area as required.

3.06 CLEANING

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site. Keep work area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.07 INTERIOR PAINTING SCHEDULE

A. Concrete and Clay Masonry Substrates, Non-traffic Surfaces:
1. Institutional Low-Odor/VOC Latex System: (MPI INT 3.1M).
a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149. Benjamin Moore - Ultra Spec 500 Latex Premier N534 (0 g/l), MPI #50 X-Green (E3)
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat
c. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3), MPI #145 X-Green. Benjamin Moore - Ultra spec 500 Latex Egg shell, N 538 (0 g/l).

B. Concrete Substrates, Traffic Surfaces:
1. Latex Floor Enamel System: (MPI INT 3.2A)

a. Prime Coat: Floor paint, latex, slip-resistant, matching topcoat.
b. Topcoat: Floor paint, latex slip-resistant, low gloss (maximum Gloss Level 3), MPI #60: Benjamin Moore - Insl-X Tough Shield Floor and Patio TS-3 (<200 g/l).

2. Clear Acrylic System, Gloss Finish: (MPI INT 3.2F)
   a. First Coat: MPI #99 - Sherwin -Williams - H&C Concrete Sealer Wet Look Water Base, at 100 to 200 sq. ft. per gal (2.4 to 4.9 sq. m per l).
   b. Second Coat: MPI #99 - Sherwin-Williams - H&C Concrete Sealer Wet Look Water Base, at 100 to 200 sq. ft. per gal (2.4 to 4.9 sq. m per l).
3. Concrete Stain System (Water-based): (MPI INT 3.2E)
   a. First Coat: Benjamin Moore - Insl-X Tuffcrete Waterborne Acrylic Concrete Stain CST-2xxx, 450-500 sq. ft. / gal., 153 g/l, MPI #58.
   b. Second coat: Benjamin Moore - Insl-X Tuffcrete Waterborne Acrylic Concrete Stain CST-2xxx, 450-500 sq. ft. / gal., 153 g/l, MPI #58.
4. Concrete Substrates, Non-Slip - High Performance Traffic Surfaces: (MPI INT 3.2L)
   a. Pigmented Polyurethane over Epoxy Slip-Resistant Deck Coating System:
      1) Prime Coat: Epoxy, gloss , (Gloss Level 6), MPI #212: S-W Armorseal 1000 HS, B67W2001 Series, at 2.5 to 4.0 mils dry, per coat.
      2) Intermediate: Polyurethane, gloss matching topcoat.
      3) Topcoat: Polyurethane, two-component, pigmented, gloss, (Gloss Level 6), MPI #212: S-W Armorseal HS Polyurethane, B65W220 Series, at 2.0 to 3.0 mils dry, per coat, with manufacturer's recommended slip-resistant aggregate.

C. CMU Substrates
1. High-Performance Epoxy Paint System: (MPI INT 4.2G)
   a. Block Filler: Block filler, epoxy, MPI #116: S-W Kem Cati-Coat HS Epoxy Filler/Sealer, at 10 to 20 mils dry, per coat.
   b. Intermediate Coat: Epoxy, high-build, low gloss, MPI #108: S-W Macropoxy 646 Fast Cure Epoxy, B58 Series, at 5 to 10 mils dry, per coat.
   c. Topcoat: Polyurethane, two-component, pigmented, semi-gloss, (Gloss Level 5), MPI #72: S-W Acrolon 218 HS Acrylic Polyurethane, B65-650 Series, at 3.0 to 6.0 mils dry, per coat.
2. Water-Based Light Industrial Coating System: (MPI INT 4.2K)
   a. Block Filler: Benjamin Moore Super Spec Masonry Int/Ext High Build Block Filler 206, 75-100 sq. ft. /gal., 8.5-11.4 mdf, 45 g/l, MPI#4, CHPS Certified.
   b. Intermediate Coat: Light industrial coating, interior, water-based, matching Topcoat.
   c. Topcoat: Light Industrial coating, interior, water-based, eggshell, (Gloss Level 5), MPI #153 X-Green: Benjamin Moore Ultra Spec HP DTM Acrylic Enamel Semi-Gloss HP29, 2.3 mdf, VOC-45.
3. Latex System: (MPI INT 4.2A)
   a. Block Filler: Latex Block Filler, MPI #4 X-Green: Benjamin Moore Super spec Masonry Int/Ext High Build Block Filler 206, 75-100 sq. ft. / gal., 8.5-11.4 mdf
   b. Intermediate coat: Latex interior, matching topcoat.
   c. Topcoat: Latex, interior flat (Gloss Level 2), MPI #44 X-Green / #144 X-Green: Benjamin Moore - Ultra Spec 500 Interior Low Sheen Finish N537, 1.8 mdf, (0 g/l), CHPS Certified.

D. Metal Substrates:
1. Latex System: (MPI INT 5.1Q)
   a. Prime Coat: Primer, rust-inhibitive, water-based, MPI #107: Benjamin Moore Super Spec Acrylic Metal Primer P04, 2.0 mdf, VOC-47, CHPS Certified.
   b. Intermediate Coat: Water-based acrylic interior, matching Topcoat.
   c. Topcoat: Water based acrylic, gloss (Gloss Level 5), MPI #147 X-Green: Benjamin Moore Ultra Spec 500 Interior Gloss finish N540, 1.8 mdf, (0 g/l), CHPS Certified.
2. Water-Based Dry-Fall System: (MPI INT 5.1C)

a. Two Top Coats: Dry-fall latex, flat, MPI #118: Benjamin Moore - Coronado Super Kote Flat Latex dry Fall N110, 1.1-1.7 mdf, 375-475 sq. ft. / gal., (46 g/l), CHPS Certified.

3. Pigmented Polyurethane over Epoxy System: (MPI INT 5.1H)
   a. Prime Coat: Epoxy, high-build, low gloss, MPI #108: Benjamin Moore - Corotech Polyamide Epoxy Semi-Gloss Coating V400, 2.5-3.0 mdf, (326 g/l).
   b. Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.
   c. Topcoat: Polyurethane, two-component, pigmented, semi-gloss, (Gloss Level 5), MPI #72: Benjamin Moore - Corotech, Alphatic Acrylic Urethane Gloss, V500, 2.5-3.6 mdf, (229 g/l).
4. Epoxy-Modified Latex System: (MPI INT 5.1K)
   a. Prime Coat: Primer, rust-inhibitive, water based, MPI #107: Benjamin Moore - Corotech Acrylic Metal Primer, V110.
   b. Intermediate Coat: Epoxy-modified latex, interior, gloss matching topcoat.
   c. Topcoat: Epoxy-modified latex, interior, gloss, (Gloss Level 6), MPI #115: Benjamin Moore - Corotech, Acrylic Epoxy Gloss, V450-90, 1.5 - 2.0 mdf, (168 g/l),
5. Acrylic/Alkyd System:
   a. Prime Coat, MPI #107: Benjamin Moore - Corotech Acrylic Metal Primer, V110,
   b. Intermediate Coat: Water-based acrylic-alkyd, interior, matching topcoat.
   c. Topcoat: Water-based acrylic-alkyd, semi-gloss, interior: Benjamin Moore Advance Waterborne Interior Alkyd Semi-Gloss N793, CHPS Certified.

E. Galvanized-Metal Substrates:
1. Pigmented Polyurethane System: (MPI INT 5.4C)
   a. Prime Coat, MPI #105: Benjamin Moore - Corotech Acrylic Metal Primer V110, 1.5 - 2.0 mdf, (VOC ,<200)
   b. Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.
   c. Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #105: Benjamin Moore - Corotech Urethane Waterborne Urethane Gloss, V540, 470-530 sq. ft. / gal., 1.6-1.8 mdf, (19 g/l).

F. Aluminum (Not Anodized or Otherwise Coated) Substrates:
1. Pigmented Polyurethane System:
   a. Prime Coat: Primer, vinyl wash: Benjamin Moore - Corotech Waterborne Bonding Primer, V175, 1.6 mdf, (84 g/l).
   b. Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.
   c. Topcoat: Polyurethane, two-component, pigmented, gloss: Benjamin Moore - Corotech Waterborne Urethane Gloss, V540, 470-530 sq. ft. / gal., (19 g/l).

G. Wood Substrates:
1. Acrylic Polymer Stage Platform Primer Coating
   a. Prime Coats: Multiple Coat (5 to 7 coats), Rosco Tough Prime, MDF 3 mils.
   b. Finish Color: Satin Black

H. Gypsum Board Substrates:
1. Latex System: (INT 9.2A)
   a. Prime Coat: Primer, latex, interior, MPI #149 X-Green: Benjamin Moore - Ultra Spec 500 Latex Primer, N534 (0 g/l),
   b. Intermediate Coat: Latex, interior, matching topcoat.
   c. Topcoat: Latex, interior, flat (Gloss Level 1), MPI #53 X-Green/#143 X-Green: Benjamin Moore - Ultra Spec 500 Latex Flat N536, (0 g/l), CHPS Certified.
2. Institutional Low-Odor/VOC Latex System: (MPI INT 9.2M)
   a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149 X- Green. Benjamin Moore - Ultra Spec 500 Latex Primer, N534, (0 g/l).
   b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
   c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1), MPI #143: Benjamin Moore - Ultra-Spec 500 Latex Flat, N536, (0 g/l), CHPS Certified.

3. High-Performance Architectural Latex System: (INT 9.2B)
   a. Prime Coat: Primer sealer, latex, interior, MPI #50 X-Green. Benjamin Moore - Ultra Spec 500 Latex Primer, N534, (0 g/l),
   b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
   c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3), MPI #139: Benjamin Moore Ultra spec 500 Latex Eggshell, N538, (0 g/l), CHPS certified.
4. Water-Based Light Industrial Coating System:
   a. Prime Coat: Primer sealer, latex, interior, MPI #50 X-Green: Benjamin Moore - Ultra Spec 500 Latex Primer, N534, (0 g/l).
   b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
   c. Topcoat: Light industrial coating, interior, water based, eggshell, (Gloss Level 3), MPI #151: Benjamin Moore - Corotech Pre-Catalyzed Waterborne Epoxy Eggshell, v342, 1.5- 2.0 mdf, (VOC-72).
5. Epoxy-Modified Latex System: (MPI INT 9.2F)
   a. Prime Coat: Primer sealer, latex, interior, MPI #50 X-Green:Benjamin Moore - Ultra Spec 500 Latex Primer, N534, (0 g/l).
   b. Intermediate Coat: Epoxy-modified latex, interior, matching topcoat.
   c. Topcoat: Epoxy-modified latex, interior, eggshell, (Gloss Level 3), MPI #115: Benjamin Moore - Corotech Pre-Catalyzed Waterborne Epoxy Eggshell, V342, 1.5 - 2.0 mdf, (VOC-72).

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Fire-protection cabinets for the following:
      a. Portable fire extinguishers.
   2. Fire Company Key Box.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semi-recessed, or surface-mounting method and relationships of box and trim to surrounding construction.

B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semi-recessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.05 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths and required blocking provisions.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

2.02 FIRE-PROTECTION CABINETS

A. Cabinet Type: Suitable for fire extinguishers.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
      a. Activar Construction Products Group, Inc. - JL Industries, Inc. (Basis of Design)
      b. Larsen's Manufacturing Company.
      c. Potter Roemer LLC.

B. Cabinet Construction: Nonrated

C. Cabinet Series: COSMOPOLITAN SERIES - STAINLESS STEEL

D. Semi-recessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
   1. Trim Type: Rolled Edge with 2 1/2 inch backbend.

E. Cabinet Trim Material: Same material and finish as door.

F. Door Material: Aluminum (ASTM B221).
   1. Color and Finish: Clear Anodized.

G. Tub Material: Cold rolled steel (standard) with Black powder-coat finish

H. Door Style: Vertical Duo panel with pull handle.

I. Door Glazing: Clear Tempered Glass.
   1. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear obscure).

J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
   1. Provide recessed door pull and friction latch as per manufacturer's standards and as selected or indicated on the drawings.
   2. Provide manufacturer's standard hinge permitting door to open 180 degrees.

K. Accessories:
   1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
   2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
   3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as specified.
      a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
         1) Location: Applied to cabinet door.
         2) Application Process: Pressure-sensitive vinyl letters.
         3) Lettering Color: Red.
         4) Orientation: Vertical.

2.03 FIRE PROTECTION CABINETS (OVAL TYPE EXTINGUISHERS)

A. Recessed Low Profile Tub Cabinet for Oval Fire Extinguishers: Orbit Series cabinets to fit into a 3 5/8 inch stud wall and meet ADA 4 inch maximum requirement for protruding objects. Manufacturer: Activar Construction Products Group, Inc. - JL Industries or approved equal.
   1. Flush door with 5/8 inch door stop.
   2. 3/8 inch flat trim with 1 3/4 inch face on frame and 1 1/4 inch trim on door.
   3. Continuous hinge.
   4. Zinc plated handle and roller catch.
   5. Clear Acrylic Glazing.
   6. Finish: Powder-coated Steel

2.04 FIRE COMPANY KEY ACCESS UNIT

A. KNOX-BOX 3200 Series: Recessed Mount - Model 3275 with recess mounting kit (RMK) with hinged door as manufactured by KNOX Company, 1601 W. Deer Valley Road, Phoenix, AZ 85027. Phone: 1.800.552.5669.
   1. Holds up to 10 keys. Access Cards may also be placed inside unit with a corresponding loss of key storage capacity.
   2. Gasketed Door for weather resistance - Knox Rainguard.
   3. UL Listed: UL 1037, UL 1610 and UL 1332.
   4. Options included: Recessed Mounting Kit (RMK)
   5. National Fire Code compliant.
   6. Unit Size: Recess Mounted Unit Flange: 7 inches wide by 7 inches high by 3 inch recess (3 7/8 inches overall depth)
   7. Knox-Coat Color: As selected by the Architect form the manufacturer's full color offering.
   8. Location: As indicated by Fire Marshal.

2.05 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
   1. Weld joints and grind smooth.

2. Provide factory-drilled mounting holes.
3. Install door hardware at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
2. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.06 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare recesses for recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.03 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
1. Fire-Protection Cabinets: 48 inches above finished floor to top of fire extinguisher handle (ADA).

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
1. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
2. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.

C. Identification: Apply vinyl lettering at locations indicated.

D. Wall Signs:
1. Location: Where shown or directed.
2. Apply on walls after field painting is completed and has been accepted.

E. Fire Department Key Access Unit: Install Knox Box in accordance with the manufacturer's instructions and in compliance with the Fire Department / Fire Marshal requirements.

3.04 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Roll-up rail mats.
   2. Surface-mounted frames.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for floor mats and frames.

B. Shop Drawings:
   1. Items penetrating floor mats and frames, including door control devices.
   2. Divisions between mat sections.
   3. Perimeter floor moldings.

C. Samples: For the following products, in manufacturer's standard sizes:
   1. Floor Mat: Assembled sections of floor mat.
   2. Frame Members: Sample of each type and color.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For floor mats and frames to include in maintenance manuals.

PART 2 - PRODUCTS

2.01 ENTRANCE FLOOR MATS AND FRAMES, GENERAL

A. Structural Performance: Provide roll-up rail mats and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:
   1. Uniform floor load of 300 lbf/sq. ft (14.36 kN/sq. m). minimum.
   2. Wheel load of 350 lb (159 kg) per wheel.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1.

2.02 ROLL-UP RAIL MATS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
   1. C/S Group.
   2. Balco, Inc.
   3. Nystrom.

B. Roll-up, Vinyl-Rail Hinged Mats: Vinyl-acrylic tread rails 1 7/8 inch wide by 3/8 inch (9.5 mm) thick, with slotted or perforated hinges.
   1. Tread Inserts: Recycled rubber tread inserts.
   2. Colors, Textures, and Patterns of Inserts: As selected by Architect from full range of industry colors.
   3. Rail Color: As selected by Architect from full range of industry colors.
   4. Hinges: Vinyl.
   5. Mat Size: As indicated.

2.03 FRAMES

A. Surface Mounted Frame: SM - Tapered EPDM Frame (7/16" thk. x 1 1/2" wide tapered vinyl) and PS - Pipe-Stem Frame (3/8" x 3/16" edge with 2" flange) at thresholds; aluminum in 6063-T5 alloy. Black EPDM trim fillers as needed to maintain 2" tread spacing.
   1. Frame color: as selected by the architect from the manufacturer's full color offering.
   2. Type finish: anodized or heavy-duty powder coat, as selected by the architect.

2.04 FABRICATION

A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

B. Surface-Mounted Frames: As indicated for permanent surface-mounted installation, complete with corner connectors, splice plates or connecting pins, and postinstalled expansion anchors.

C. Coat concealed surfaces of aluminum frames that contact cementitious material with manufacturer's standard protective coating.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and floor conditions for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.
   1. Anchor fixed surface-type frame members to floor with devices spaced as recommended by manufacturer.

3.03 PROTECTION

A. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section describes the general requirements for all mechanical items and systems required by the Contract Documents.

B. Comply with all Contract Requirements, General Conditions, Supplementary Conditions and Division 1 Sections applying to or affecting the Work of Division 23.

C. Unless specifically dimensioned, the Work shown on the Drawings is in diagrammatic form only to show general arrangement.

D. Include, in the Work, all accessories and appurtenances, necessary and integral, for the intended operation of any system, component or device, as such systems, components and devices are specified.

E. Do not install pipe or conduit through ductwork.

F. If the pipe or duct size shown on the Drawings does not match the connection size of the equipment that it is connected to, provide the necessary transition pieces at the piece of equipment.

G. Do not use or allow to be used asbestos or asbestos-containing materials on this project. Be rigorous in assuring that all materials, equipment, systems and components thereof do not contain asbestos. Any deviations from this requirement shall be remedied at the Contractor's expense without regard to prior submittal approvals.

1.02 RELATED DOCUMENTS

A. The General Conditions and General Requirements Division 1 apply to the Work of this Section.

1.03 REFERENCE STANDARDS

A. Compliance with the following codes and standards shall be required:
1. Codes, Rules and Regulations of the State of New York
2. AABC, American Air Balance Council
3. ADC, Air Diffusion Council
4. AGA, American Gas Association
5. AMCA, Air Moving and Conditioning Association
6. ANSI, American National Standards Institute
7. ARI, American Refrigeration Institute
8. ASA, Acoustical Society of America
9. ASHRAE, American Society of Heating, Refrigeration and Air Conditioning Engineers
10. ASME, American Society of Mechanical Engineers
11. ASSE, American Society of Sanitary Engineers
12. ASTM, American Society for Testing Materials
13. AWS, American Welding Society
14. AWWA, American Water Works Association
15. BSA, Board of Standards and Appeals
16. FM, Factory Mutual
17. F.S. or FED, Spec. Federal Specification
18. IRI, Industrial Risk Insurers
19. MEA, Materials and Equipment Acceptance
20. MSS, Manufacturer's Standardization Society of the Valve and Fitting Industry
21. NACE, National Association or Corrosion Engineers
22. NEBB, National Environmental Balancing Bureau
23. NEC, National Electrical Code (NFPA 70) / 2020
24. NEMA, National Electrical Manufacturers Association

25. NFPA, National Fire Protection Association
26. OSHA, Occupational Safety and Health Act
27. SMACNA, Sheet Metal and Air Conditioning Contractor's National Association
28. TEMA, Tubular Exchanger Manufacturers Association
29. UL, Underwriters Laboratories, Inc.
30. USAS, USA Standards Institute (Formerly ASA)

B. Compliance with the following Codes, Rules and Regulations and those referenced within as applicable to work in the State of New York shall be required:
1. New York State Industrial Code Rules
2. International Building Code 2018
3. International Fire Code 2018
4. International Existing Building Code 2018
5. International Fuel Gas Code 2018
6. International Plumbing Code 2018
7. International Energy Conservation Code 2018
8. International Mechanical Code 2018
9. International Property Maintenance Code 2018
10. International Residential Code 2018
11. Uniform Fire Prevention and Building Code 2020
12. ASHRAE 90.1 - 2019 (Commercial & all other Residential except Low-Rise Residential)
13. NYStretch Energy Code 2020
14. DEC, New York State Department of Environmental Conservation - 6 NYCRR Part 613 Handling and Storage of Petroleum

1.04 DEFINITIONS

A. "Provide" means furnish and install, complete the specified material, equipment or other items and perform all required labor to make a finished installation.

B. "Furnish and install" has the same meaning as given above for "Provide."

C. Refer to General Conditions for other definitions.

1.05 ABBREVIATIONS

A. Reference by abbreviation may be made in the Specifications and the Drawings in accordance with the following list:
1. HVAC, Heating, Ventilating and Air Conditioning
2. CM, Construction Manager
3. AC, Air Conditioning
4. H & V, Heating and Ventilating
5. AWG, American Wire Gauge
6. BWG, Birmingham Wire Gauge
7. USS , United States Standard
8. B & S, Brown & Sharpe
9. OS & Y, Outside Screw and Yoke
10. IBBM, Iron Body Brass Mounted
11. WSP, Working Steam Pressure
12. PSIG, Pounds per Square Inch Gauge
13. PRV, Pressure Reducing Valve
14. GPM, Gallons per Minute
15. MBH, Thousand BTU per hour
16. BTU, British Thermal Units
17. WG, Water Gage
18. LB, Pound (Also shown as: #)
19. ASME, American Society of Mechanical Engineers
20. ASTM, American Society for Testing Materials

21. ABMA,American Boiler Manufacturers Association
22. ASA, American Standards Associates
23. MER, Mechanical Equipment Room
    See Drawings for additional abbreviations

1.06 REVIEW OF CONTRACT DOCUMENTS AND SITE

A. Give written notice with the submission of bid to the Architect/Engineer of any materials or apparatus believed inadequate or unsuitable, in violation of laws, ordinances, rules or regulations of Authorities having jurisdiction, and any necessary items of work omitted. In the absence of such written notice it is mutually agreed that the Contractor has included the cost of all required items in his proposal for a complete project.

B. Contractors shall acknowledge that they have examined the Plans, Specifications and Site, and that from his own investigations he has satisfied himself as to the nature and location of the Work; the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials; availability of labor, utilities, roads and uncertainties of weather; the composition and condition of the ground; the characters quality and quantity of subsurface materials to be encountered; the character of equipment and facilities needed preliminary to and during the execution of the Work; all federal, state, county, township and municipal laws, ordinances and regulations particularly those relating to employment of labor, rates of wages, and construction methods; and all other matters which can in any way affect the Work or the cost thereof under this Contract. Any failure by the Contractor to acquaint himself with the available information concerning these conditions will not relieve him from the responsibility for successfully performing the Work.

C. Owner assumes no responsibility for any understanding or representation made during or prior to the negotiation and execution of this Contract unless such understanding or representations are expressly stated in the Contract and the Contract expressly provides that the responsibility, therefore, is assumed by the Owner.

1.07 MEASUREMENTS

A. Base all measurements, both horizontal and vertical from established bench marks. Make all Work agree with these established lines and levels. Verify all measurements at site; and check the correctness of same as related to the Work.

1.08 LABOR AND MATERIALS

A. Provide all materials and apparatus required for the Work of new and first-class quality. Furnish, deliver, arrange, erect, connect and finish all materials and equipment in every detail, so selected and arranged as to fit properly into the building spaces.

B. Remove all materials delivered, or work erected, which does not comply with Drawings or Specifications, and replace with proper materials, or correct such work as directed, at no additional cost to the Owner.

1.09 COVERING OF WORK

A. Do not cover up or hide from view any duct, piping, fitting, or other work of any kind before it has been examined or approved by the Architect/Engineer and/or other authority having jurisdiction over the same. Remove and correct immediately any unacceptable or imperfect work or unauthorized or disapproved materials discovered immediately after being disapproved.

1.10 PROTECTION

A. Protect the Work and material of all trades from damage and replace all damaged material with new.

B. Protect work and equipment until the Work is finally inspected, tested, and accepted; protect the 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 foreign material.

C. Preserve all public and private property, along and adjacent to the Work, and use every precaution necessary to prevent damage or injury thereto. Use suitable precautions to prevent damage to pipes, conduits and other underground structures or utilities, and carefully protect from disturbance or damage all property marks until an authorized agent has witnessed or otherwise referenced their location, and do not remove them until directed.

1.11 CUTTING AND PATCHING

A. Provide all cutting and rough patching required for the Work. Perform all finish patching.

B. Furnish and locate all sleeves and inserts required before the floors and walls are built, pay the cost of cutting and patching required for pipes where sleeves and inserts were not installed in time, or where incorrectly located. Provide all drilling required for the installation of hangers.

C. Punch or drill all holes cut through concrete slabs or arches from the underside. Do not cut structural members without the approval of the Architect/Engineer. Perform all cutting in a manner directed by the Architect/Engineer.

D. Do not do any cutting that may impair strength of building construction. Do no drill any holes, except for small screws, in beams or other structural members without obtaining prior approval. All Work shall be done in a neat manner by mechanics skilled in their trades and as approved.

1.12 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Rigging Plan
      a. Include the name of the rigging company; a layout drawing that details the crane with its outriggers extended outward. Provide dimensions showing how rigging operations will affect the road and parking lines being used, the type of crane and its specification including crane arm height, lift capacity, crane reach.
   2. Safety Data Sheets
   3. Training Plan & Schedule
   4. Training Verification Record

B. Reports
   1. Compliance with listings and approvals for equipment and for fire ratings.
   2. Acceptance certificates from inspecting agencies.
   3. Complete printed and illustrated operating instructions in report format.
   4. Manufacturer's performance tests of equipment.
   5. Field pipe and duct testing reports.
   6. Field operating test results for equipment.
   7. Performance report on the balancing of air and water systems.
   8. Performance reports for vibration isolation equipment.
   9. Manufacturer's reports on motorized equipment alignment and installation.

C. Specific references to any article, device, product or material, fixture or item of equipment by name, make or catalog number shall be interpreted as establishing a basis of cost and a standard of quality. All devices shall be of the make and type listed by Special Agencies, such as the Underwriters' Laboratories, and where required, approved by the Fire Department or authority having jurisdiction.

1.13 SPACE ALLOTMENTS AND SUBSTITUTIONS

A. The space allotments and equipment layouts on the Drawings are based on the manufacturer’s model indicated or scheduled as the “Basis of Design”. Ensure that any equipment that is submitted other than the “Basis of Design” will fit in the space allotment and will provide the necessary maintenance clearances as recommended by the manufacturer. If maintenance clearances are not met, pay for any changes such that maintenance clearances will be met.

B. Bear all costs associated with re-layout of the equipment, changes to piping/ductwork, and other changes as required if approved equipment other than the “Basis of Design” equipment is

purchased. This shall also include any structural steel modifications and structural steel design changes. Submit, at no cost to the Owner, a steel design stamped by a structural engineer licensed in the state in which the Work is to be performed for structural modifications that must be made resulting from the use of equipment other than the “Basis of Design” or not specified.

1.14 PAINTING

A. Prime paint all bare supplemental steel, supports and hangers required for the installation of Division 23 Work in accordance with “Painting” Specification Section. Touch up welds of galvanized surfaces with galvanizing primer.

1.15 SAFETY DATA SHEETS

A. Submit safety data sheets (SDS) for all chemicals, hydraulic fluids, seal oils, lubricating oils, glycols and any other hazardous materials used in the performance of the Work, in accordance with the US Department of Labor, Occupational Safety and Health Administration (OSHA) hazard communication and right-to-know requirements stipulated in 29 CFR 1910.1200 (g).

1.16 MOTORS AND STARTERS

A. Provide new NEMA Standard electric motors, sized and designed to operate at full load and full speed continuously without causing noise, vibration, and temperature rise in excess of their rating. Provide motors with a service factor of at least 1.15.

B. Equip motors for belt driven equipment with rails with adjusting screws for belt tension adjustment. Weather protect motors exposed to the weather.

C. Install high efficiency electric motors for air handling units, relief fans, and exhaust fans.

D. Provide all motors for use with Variable Frequency Drives with “high efficiency inverter duty” insulation class “F” with class “B” temperature rise and that conform to or exceed the International Energy Conservation Code or the Federal EP Act of 1992 requirements for efficiency.

E. Provide stainless steel nameplates, permanently attached to the motor, and having the following information as a minimum:
   1. Manufacturer
   2. Type
   3. Model
   4. Horsepower
   5. Service Factor
   6. RPM
   7. Voltage/Phase/Frequency
   8. Enclosure Type
   9. Frame Size
   10. Full-Load Current
   11. UL Label (where applicable)
   12. Lead Connection Diagram
   13. Bearing Data
   14. Efficiency at Full Load.

F. Provide motors whose sound power levels do not exceed that recommended in NEMA MG 1-12.49.

G. Provide motors with drive shafts long enough to extend completely through belt sheaves when sheaves are properly aligned and balanced.

H. Provide NEMA 4X weatherproof enclosures for VFDs, motor starters, etc. on all manufacturer provided or field installed electrical devices for equipment located outdoors, unless otherwise noted in specifications or plans.

I. Provide weatherproof NEMA 4X disconnect switches when located outdoors.

J. Motor Characteristics:

1. 120V/1/60 Hz, 208V/1/60 Hz or 240V/1/60 Hz: Capacitor start, open drip-proof type, ball bearing, rated 40 C. continuous rise.
2. 208V/3/60 Hz, 240V/3/60 Hz or 460/3/60 Hz: NEMA B, normal starting torque, single speed, squirrel-cage type, open drip-proof, rated 40 C continuous rise, with ball bearings rated for B-10 life of 100,000 hours and fitted with grease fittings and relief ports. Provide motors with aluminum end brackets with steel inserts in bearing cavities.

1.17 ACOUSTICAL PERFORMANCE OF EQUIPMENT AND SYSTEMS

A. Install the Work in such a manner that noise levels from operation of motor driven equipment, whether airborne or structure-borne, and noise levels created by or within air handling equipment and air distribution and control media, do not to exceed sound pressure levels determined by the noise criteria curves published in the ASHRAE guide.

B. Acoustical Tests
1. Owner may direct the Contractor to conduct sound tests for those areas he deems too noisy.
2. If NC level exceeds the requirements of the Contract Documents due to improper installation or operation of mechanical systems, make changes or repairs to bring noise levels to within required levels.
3. Retest until specified criteria have been met.

1.18 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Instructions and Demonstration for Owner's Personnel
1. Provide operating and maintenance instruction to the Owner when project is completed and all HVAC equipment serving the building is ready to be turned over to the Owner.
2. Turn over the HVAC equipment to the Owner only after the final testing and proper balancing of HVAC systems.
3. Instruct the Owner's personnel in the use, operation and maintenance of all equipment of each system.
4. The above instruction requirements are in addition to that specified for specific equipment or systems. Conform to specified requirements if more stringent or longer instruction is specified for specific equipment or systems.

1.19 CODES, RULES, PERMITS & FEES

A. Give all necessary notices, obtain all permits and pay all government sales taxes, fees, and other costs, in connection with the Work. Unless indicated otherwise, fees for all utility connections, extensions, and tap fees for water, storm, sewer, gas, telephone, and electricity will be paid directly to utility companies and/or agencies by the Owner. File all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction; obtain all required certificates of inspection for the Work and deliver same to the Owner's Representative before request for acceptance and final payment for the Work.

B. Conform to the requirements of the NFPA, NEC, FM, UL and any other local or State codes which may govern.

1.20 RECORD DRAWINGS

A. During the progress of the Work, make a record set of drawings of all changes by which the actual installation differs from the Drawings.

B. Create all record drawings in AutoCAD version 2020 or later in .dwg format. Upon completion of the Work, submit a digital copy (PDF) to the Architect/Engineer for approval of the record drawings, of the same size as the Drawings for approval. Upon approval by the Architect/Engineer furnish the Owner a digital copy (PDF) of the record drawings along with one hard copy for the Owner's records.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 CLEANING AND ADJUSTING

A. Cleaning
   1. Blow out, clean and flush each system of piping and equipment, to thoroughly clean the systems.
   2. Clean all materials and equipment; leave in condition ready to operate and ready to receive final finishes where required.
   3. Clean the operating equipment and systems to be dust free inside and out.
   4. Clean concealed and unoccupied areas such as plenums, pipe and duct spaces and equipment rooms to be free of rubbish and dust.

B. Adjusting
   1. Adjust and align equipment interconnected with couplings or belts.
   2. Adjust valves of all types and operating equipment of all types to provide proper operation.
   3. Clean all strainers after system cleaning and flushing and again before system startup.

C. Lubrication
   1. Lubricate equipment as recommended by the manufacturer, during temporary construction use.
   2. Provide complete lubrication just prior to acceptance.

D. Permanent Equipment Operating During Construction
   1. Use only in same service as the permanent applications.
   2. Use disposable filters during temporary operation.
   3. Replace expendable media, including belts used for temporary operation and similar materials just prior to acceptance of the Work.
   4. Repack packing in equipment operated during construction just prior to system acceptance, using materials and methods specified by the equipment manufacturer.

E. Retouch or repaint equipment furnished with factory finish as required to provide same appearance as new.

F. Tools
   1. Provide one set of specialized or non-standard maintenance tools and devices required for servicing the installed equipment.

3.02 EQUIPMENT BASES, PLATFORMS AND SUPPORTS

A. Provide supporting platforms, steel supports, anchor bolts, inserts, etc., for all equipment and apparatus provided.

B. Obtain prior approval for installation method of structural steel required to frame into building structural members for the proper support of equipment, conduit, etc. Welding will be permitted only when approved by the Architect/Engineer.

C. Submit shop drawings of supports to the Architect/Engineer for approval before fabricating or constructing.

D. Provide leveling channels, anchor bolts, complete with nuts and washers, for all apparatus and equipment secured to concrete pads and further supply exact information and dimensions for the location of these leveling channels, anchor bolts, inserts, concrete bases and pads.

E. Where supports are on concrete construction, take care not to weaken concrete or penetrate waterproofing.

3.03 ACCESSIBILITY

A. Install valves, dampers and other items requiring access conveniently and accessibly located with reference to the finished building.

3.04 USE OF EQUIPMENT

A. The use of any equipment, or any part thereof, even with the Owner's consent, is not an indication of acceptance of the Work on the part of the Owner, nor shall it be construed to obligate the Owner in any way to accept improper work or defective materials.

3.05 MODIFICATIONS OF EXISTING WORK

A. Coordinate the Work with all other contractors and provide necessary dimensions for all openings. Provide all cuts and openings which are necessary for the Work for passage of piping and ductwork

B. Upon completion, remove all temporary piping and equipment, shoring, scaffolds, etc., and leave all areas clean and free from material and debris resulting from the Work performed under this Section. Provide rough patching in areas required.

3.06 EQUIPMENT INSTALLATION

A. Locate and set equipment anchor bolts, dowels and aligning devices for equipment requiring them.

B. Level and shim the equipment; coordinate and oversee the grouting work.

C. Perform field assembly, installation and alignment of equipment under direct supervision provided by the manufacturer or with inspections, adjustments and approval by the manufacturer.

D. Alignment and Lubrication Certification for Motor Driven Apparatus
   1. After permanent installation has been made and connections have been completed, but before the equipment is continuously operated, have a qualified representative of the equipment manufacturer inspect the installation and report in writing on the manufacturer's letterhead on the following:
      a. Whether shaft, bearing, seal, coupling, and belt drive alignment and doweling is within the manufacturer’s required tolerances so that the equipment will remain aligned in the normal service intended by the Contract Documents and that no strain or distortion will occur in normal service.
      b. That all parts of the apparatus are properly lubricated for operation.
      c. That the installation is in accordance with manufacturer's instructions.
      d. That suitable maintenance and operating instructions have been provided for the Owner's use.
      e. Make any corrections to items that are required or recommended based on the manufacturer’s inspection and have the equipment re-inspected.

E. Belt Drives
   1. V-belt drives - a driving and driven sheave grooved for belts of trapezoidal cross-section. Construct belts of fabric and rubber so designed so as not to touch the bottom of the grooves, the power being transmitted by the contact between the belts and V-shaped groove sides. Design drives for a minimum of 150 percent of motor horsepower. Provide companion type driven sheaves.
   2. Select drives to provide for 12-1/2 percent variation in speed, plus or minus, from specified speed. Provide all motors with adjustable sheaves except where indicated otherwise in the Specifications or on the Drawings.
   3. Install all fans with adjustable pitch sheaves on their drive motors. Select sheaves to provide air quantities under specified conditions. Put air systems into operation, and determine as a result of the completed air balance the actual size of sheaves required to produce specified air quantities on installed systems. The adjustable pitch sheaves shall then be replaced with the proper size fixed sheaves. Remove adjustable pitch sheaves from premises. Provide fixed motor sheaves manufactured by Wood's.
   4. Where indicated on the Drawings or specified, provide spare motor, bearings, and belts.

F. Machinery Guards
   1. Protect motor drives by guards furnished by the equipment manufacturer or in accordance with the Sheet Metal and Air Conditioning Contractors National Association's Low Pressure Duct Manual. Provide guards of all types approved as acceptable under OSHA Standards.

G. Equipment Start-up
   1. Require each equipment manufacturer to provide qualified personnel to inspect and approve equipment and installation and to supervise the start-up of the equipment and to supervise the operating tests of the equipment.
   2. If a minimum number of hours for start-up and instruction are not stated with the equipment specifications, these shall be 2 full 8-hour working days as a minimum.
   3. Advise Owner of start-up at least 72 hours in advance.

3.07 CLOSEOUT PROCEDURES

A. Field Review and Punchlist:
   1. Notice of substantial completion Contractor shall submit written notice of substantial completion prior to requesting 'Substantial Completion Punchlist Inspection'.
   2. Air and hydronic test balance reports Contractor shall submit all air and hydronic test balance reports a minimum of 5 days prior to requesting punchlist inspection. The reports shall be complete for all subject equipment. If any reports are missing or incomplete, contractor shall identify those items and provide a schedule of balancing completion and excepted report submission.
   3. Piping pressure test As applicable, contractor shall provide written record of successful piping pressure test for each piping system, on company letterhead, with required data per specification, duration of test, and photographic evidence of gauge at test pressure.
      a. The contractor shall provide a written response to the punchlist items within 2 weeks of receipt of punchlist with a schedule of completion of the open items (or commentary if discussion or objection are raised).
   4. If contractor requests a punchlist inspection and engineer finds incomplete work within the work claimed to be substantially complete, the engineer will inform the contractor and may (at engineer's choice) terminate the inspection prior to reviewing all work. The Contractor will be responsible for reimbursing engineer for subsequent punchlist activities.
   5. Upon receipt of engineer's punchlist inspection report, the contractor shall respond to each comment with an acknowledgement of each item (initialed, dated and photo evidence of completed work) or disagreement and written explanation of disagreement.
   6. The contactor may respond with acknowledgement by providing photo of corrective action, or at the engineer's choice and upon contractor's written confirmation that all punchlist items have been addressed, may request a final punchlist inspection.

B. General Operating and Maintenance Instructions Arrange for each installer of operating equipment and other work that requires regular or continuing maintenance, to meet at the site with the Owner's personnel to provide necessary basic instructions in the proper operation and maintenance of the entire Work. Where installers are not expert in the required procedures, include instruction by the manufacturer's representatives.

C. Where applicable, provide instruction and training, including application of special coatings systems, at manufacturer's recommendation.

D. Provide a detailed review of the following items:
   1. Maintenance manuals
   2. Record documents and catalog cuts for each piece of equipment.
   3. Spare parts and materials
   4. Tools
   5. Lubricants
   6. Fuels
   7. Identification systems
   8. Control sequences
   9. Hazards
   10. Cleaning

E. Warranties, bonds, maintenance agreements: and similar continuing commitments.

F. Demonstrate the following procedures:

1. Start-up
2. Shut-down
3. Emergency operations
4. Noise and vibration adjustments
5. Safety procedures
6. Economy and efficiency adjustments
7. Effective energy utilization.

G. Prepare instruction periods to consist of approximately 50% classroom instruction and 50% "hands-on" instruction. Provide minimum instruction periods as follows:

Systems or Equipment	Training Time (Hours)
Chillers	16 hrs.
Cooling Towers	16 hrs.
Roof Top Units	8 hrs.
Air Handlers	8 hrs.
Boilers and Burners	16 hrs
DDC Control System	24 hrs.
All other equipment	4 hrs. (each)

Note: Consult individual equipment specification sections for additional training requirements.

H. Training Plan & Schedule Prepare a written schedule and agenda for each session and submit for review and approval. Include date, location, purpose, specific scope, proposed attendance and session duration.

I. Training Verification Record Record training sessions in digital format, format as selected by the Owner. Turn over digital files to the Owner after training has been completed.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the draining, disconnecting, dismantling, demolition, removal, relocation, rerouting and reconnection of existing mechanical facilities, in a neat and workmanlike manner, of mechanical systems, materials and accessories as required, as shown on the Drawings and specified herein, to accomplish alteration, restoration and to accommodate the Work.

1.02 RELATED WORK

A. General Mechanical Requirements - Section 230010

1.03 REFERENCES

A. ANSI A10.6 - Safety Requirements for Demolition

B. BOCA Building Code

C. IBC (Including State Amendments)

D. NADC - Demolition Safety Manual

E. NFPA Fire Code

F. NFPA 51B - Cutting and Welding Processes

G. NFPA 70 - National Electrical Code

H. NFPA 241 - Safeguarding Building Construction and Demolition Operations

I. OSHA 29 CRF 1910 - Occupational Safety and Health Standards

J. US EPA - Clean Air Act Amendment of 1990.

1.04 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Fire Watch Procedure
   2. Inspection Report of Underground Piping Systems
   3. Welding/Burning Permits:
      a. Obtain a welding/burning permit from the Local Fire Official prior to the start of any welding or burning in accordance with the Local Fire Code or as required by the Owner.

1.05 QUALITY ASSURANCE

A. Only employ workers skilled in the specific trades involved for cutting, patching and removal.

B. Job Conditions: Prior to start of the Work, make an inspection accompanied by the Architect/Engineer to determine physical condition of adjacent construction that is to remain.

1.06 SPECIAL PRECAUTIONS

A. Do not torch cut ductwork.

B. Torch cutting of other mechanical equipment will be permitted only with the specific written approval of the Architect/Engineer.

C. Include “Fire Watch” procedures as required by the Fire Code and/or Owner’s Fire Insurance Carrier for any cutting work that may produce sparks. Submit fire watch procedures for approval.

D. Perform draining operations so that damage to existing building components does not occur.

PART 2 - PRODUCTS

2.01 GENERAL

A. Adequately sized rubbish containers for the proper and safe disposal of all debris.

PART 3 - EXECUTION

3.01 PREPARATION

A. Construct temporary partitions enclosing respective work prior to any demolition work. Erect temporary fencing and signage around demolished materials.

B. Protect existing materials and equipment which are not to be demolished.

C. Prevent movement of structure; provide required bracing and shoring.

D. Do not begin the work until the time schedules and manner of operations have been approved by the Architect/Engineer and Owner. Include all interruptions of existing services in schedules submitted for approval by the Architect/Engineer and Owner.

3.02 GENERAL

A. Provide alteration and demolition of mechanical facilities as required by the Drawings and Specifications. The Drawings are diagrammatic and do not show the exact location of all existing mechanical work. Where existing equipment is to remain in service during construction, provide rerouting and reconnection of mechanical services as required to maintain continuous service.

B. Review all equipment with the Architect/Engineer and Owner prior to disposal. Completely remove existing ductwork, piping, conduit and similar items to be abandoned that are not embedded in walls or floor slabs unless otherwise shown on the Drawings. Cap open ends at all walls and floors.

C. Remove, store and protect all equipment or materials designated to be turned over to the Owner. Coordinate exact location of storage with the Owner.

D. Temporarily cap ends of ductwork, piping and sanitary vent piping to avoid entry of dirt, debris, or discharge of foul odors and gases.

E. Where existing louvers or ductwork penetrations are to remain, blank-off the opening on the inside with galvanized sheet metal on both sides of 2-inch thick, 6 pcf density rigid fiberglass board insulation. Paint side attached to the opening with weather resistant flat black paint.

F. Do not close or obstruct egress width to exits.

G. Do not disable or disrupt building fire or life safety systems without five (5) days prior written notice to the Architect/Engineer and Owner.

H. Conform to procedures applicable when discovering hazardous or contaminated materials.

I. Conduct demolition to minimize interference with adjacent building structures or Owner's operations.

J. Cease operations immediately if structure appears to be in danger or hazardous materials are encountered. Notify Architect/Engineer. Do not resume operations until directed.

K. Demolish in an orderly and careful manner. Do not cut or remove more than is necessary to accommodate the new construction or alteration.

L. Remove demolished materials from site daily. Do not burn or bury materials on site. Dispose of all material at an approved disposal facility.

M. Protect finished surfaces at all times and repair or replace, if damaged, to match existing construction to the satisfaction of the Architect/Engineer.

3.03 PIPING REMOVAL

A. Cut off all welded piping square at the locations indicated on the Drawings. No cutting is required where the demolition ends at a flanged valve or equipment. Close off all openings of any remaining valves, piping or fittings with weld caps or blind flanges to prevent debris from entering the existing system.

B. Disconnect all threaded piping at the location indicated on the Drawings. Close off all openings of remaining valves, piping, fittings and equipment with pipe plugs or pipe caps as required to prevent debris from entering the existing systems.

C. Remove all pipe hangers, supports, miscellaneous steel and anchors with the piping.

3.04 PROTECTION FROM FREEZING

A. It is intended that the building remain protected from damage due to freezing temperatures. To that end, keep in place and in operation existing equipment and systems used for heating until scheduling permits shutdown.

B. Where the removal of equipment, etc. will leave an area unprotected from freezing, notify the Owner and Architect/Engineer at least 72 hours in advance prior to removal so appropriate steps can be taken by the Owner to protect the area. Provide temporary heating equipment sufficient to prevent freezing.

C. It is the Contractor's responsibility to ensure that piping systems that are being worked on are completely drained from water prior to the start of demolition. If water is not drained and the water freezes it is the Contractor's responsibility to replace piping and repair all damages caused by water leakage at his own expense.

3.05 DISCONNECTION AND INTERRUPTION OF MECHANICAL SERVICES

A. When portions of an existing piping system or ductwork system are removed, and this removal causes loss of operation to another piece of equipment due to open or disconnected piping or ductwork, cap piping or ductwork or provide temporary piping or ductwork system to retain operation of the system.

3.06 MECHANICAL EQUIPMENT REMOVAL

A. Remove all mechanical equipment as shown on the Drawings. Remove all electrical work, including wiring between equipment, and wiring to power source or point of origin.

B. Where equipment is supported by steel and/or structural supports, remove these supports.

3.07 REFRIGERANT REMOVAL

A. Recover and dispose of all existing refrigerant charges in accordance with EPA regulations. Comply with all regulations applicable to the release of chlorofluorocarbon refrigerants to the atmosphere.

3.08 DUCTWORK REMOVAL

A. Disconnect all ductwork which must be removed, at the closest joint and support the remaining ductwork.

B. Prepare all remaining ductwork joints at the point of disconnection to receive new ducts or blank-off panels.

C. Remove all ductwork supports and miscellaneous steel with ductwork to be demolished.

3.09 INSULATION REMOVAL

A. Remove insulation, together with all piping, fittings, valves and equipment designated for demolition.

3.10 CONTROL WIRING REMOVAL

A. Disconnect and remove all control wiring and tubing, including conduit, for the Automatic Temperature Control (ATC) System associated with equipment and systems to be removed.

3.11 CONCRETE HOUSEKEEPING PAD REMOVALS

A. Unless noted otherwise on drawings, remove existing concrete housekeeping pads remaining unused as a result of equipment removals.
   1. Remove or cut dowels down flush to existing MER floor elevation to eliminate trip hazard.
   2. Grind down high points to be level with existing MER floor.
   3. Patch area of pad removal with concrete patch as required to fill in all holes and low points, and provide trowel smooth finish.
   4. If section of existing pad to remain, saw cut straight edge and grind a minimum 1/4" chamfer on sharp corners of existing pad edges to remain.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. National Electrical Manufacturers Association (NEMA):
   1. MG 1 - Motors and Generators
   2. MG 2 - Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators

B. National Fire Protection Association (NFPA)
   1. 70-208 - National Electric Code (NEC)

C. Institute of Electrical and Electronics Engineers (IEEE)
   1. 112-04 - Standard Test Procedure for Polyphase Induction Motors and Generators

D. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
   1. 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

PART 2 - PRODUCTS

2.01 MOTORS AND STARTERS

A. Provide new NEMA Standard electric motors, sized and designed to operate at full load and full speed continuously without causing noise, vibration, and temperature rise in excess of their rating. Provide motors with a service factor of at least 1.15.

B. Equip motors for belt-driven equipment with rails with adjusting screws for belt tension adjustment. Weather protect motors exposed to the weather.

C. Install high-efficiency electric motors for air handling units, relief fans, and exhaust fans.

D. Provide all motors for use with Variable Frequency Drives with “high efficiency inverter duty” insulation class “F” with class “B” temperature rise, and that conform to or exceed NYSECC or the Federal EP Act of 1992 requirements for efficiency.

E. Provide stainless steel nameplates, permanently attached to the motor, and having the following information as a minimum:
   1. Manufacturer
   2. Type
   3. Model
   4. Horsepower
   5. Service Factor
   6. RPM
   7. Voltage/Phase/Frequency
   8. Enclosure Type
   9. Frame Size
   10. Full-Load Current
   11. UL Label (where applicable)
   12. Lead Connection Diagram
   13. Bearing Data
   14. Efficiency at Full Load.

F. Provide motors whose sound power levels do not exceed that recommended in NEMA MG 1-12.49.

G. Provide motors with drive shafts long enough to extend completely through belt sheaves when sheaves are properly aligned and balanced.

H. Protect motor starters on equipment located outdoors in weatherproof NEMA 4X enclosures.

I. Provide weatherproof NEMA 4X disconnect switches when located outdoors.

J. Motor Characteristics:
   1. 120V/1/60 Hz, 208V/1/60 Hz or 240V/1/60 Hz: Capacitor start, open drip-proof type, ball bearing, rated 40 C. continuous rise.

2. 208V/3/60 Hz, 240V/3/60 Hz or 460/3/60 Hz: NEMA B, normal starting torque, single speed, squirrel-cage type, open drip-proof, rated 40 C continuous rise, with ball bearings rated for B-10 life of 100,000 hours and fitted with grease fittings and relief ports. Provide motors with aluminum end brackets with steel inserts in bearing cavities.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install motors in accordance with manufacturer's recommendations, the NEC, NEMA, as shown on the drawings and/or as required by other sections of these specifications.

3.02 FIELD TESTS

A. Perform an electric insulation resistance test using a megohmmeter on all motors after installation, before start-up. All shall test free from grounds.

B. Perform Load test in accordance with ANSI/IEEE 112, Test Method B, to determine freedom from electrical or mechanical defects and compliance with performance data.

C. Insulation Resistance: Not less than one-half meg-ohm between conductors and frame, to be determined at the time of final inspection.

D. All test data shall be compiled into a report form for each motor and provided to the contracting officer or their representative.

END OF SECTION 230512

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The Work covered under this Section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the pipe hanger and supports as described in this Specification. Size hangers and supports to fit the outside diameter of the piping.

1.02 REFERENCES

A. ASTM B633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel

B. ASTM A123 - Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip

C. ASTM A653 - Specification for Steel Sheet, Zinc-Coated by the Hot-Dip Process

D. ASTM A1011 - Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability (Formerly ASTM A570)

E. MSS SP58 - Manufacturers Standardization Society: Pipe Hangers and Supports- Materials, Design, and Manufacture

F. MSS SP69 - Manufacturers Standardization Society: Pipe Hangers and Supports- Selection and Application

1.03 QUALITY ASSURANCE

A. Provide hangers and supports used in fire protection piping systems listed and labeled by Underwriters Laboratories.

B. Steel pipe hangers and supports shall have the manufacturer’s name, part number, and applicable size stamped in the part itself for identification.

C. Design and manufacture hangers and supports in conformance with MSS SP 58.

1.04 SUBMITTALS

A. Submit for review, products utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Pipe, Hangers, and Supports Product Data Submittal
      a. Pipe Hanger and Support Application Schedule.
      b. Product data on all hanger and support devices, including shields and attachment methods. Include as a minimum as part of product data materials, finishes, approvals, load ratings, and dimensional information.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with these specifications, provide pipe hanger and support systems manufactured by:
   1. Cooper B-Line, Inc.
   2. Carpenter and Patterson
   3. Grinnell

2.02 PIPE HANGERS AND SUPPORTS

A. Hangers
   1. Uninsulated pipes 2 inch and smaller:
      a. Adjustable steel swivel ring (band type) hanger, B-Line B3170.
      b. Adjustable steel swivel J-hanger, B-Line B3690.
      c. Malleable iron ring hanger, B-Line B3198R or hinged ring hanger, B3198H.
      d. Malleable iron split-ring hanger with eye socket, B-Line B3173 with B3222.
      e. Adjustable steel clevis hanger, B-Line B3104 or B3100.

2. Uninsulated pipes 2-1/2 inch and larger: ha
   a. Adjustable steel clevis hanger, B-Line B3100.
   b. Pipe roll with sockets, B-Line B3114.
   c. Adjustable steel yoke pipe roll, B-Line B3110.
3. Insulated pipe- Hot or steam piping:
   a. 2 inch and smaller pipes: use adjustable steel clevis with galvanized sheet metal shield. B-Line B3100 with B3151 series.
   b. 2-1/2 inch and larger pipes
      1) Adjustable steel yoke pipe roll with pipe covering protection saddle. B-Line B3110 with B3160-B3165 series.
      2) Pipe roll with sockets with pipe covering protection saddle, B-Line B3114 with B3160-B3165 series.
4. Insulated pipe- Cold or chilled water piping:
   a. 5 inch and smaller pipes: use adjustable steel clevis with galvanized sheet metal shield. B-Line B3100 with B3151 series.
   b. 6 inch and larger pipes:
      1) Pipe roll with sockets with pipe covering protection saddle, B-Line B3114 with B3160-B3165 series.
      2) Adjustable steel yoke pipe roll with pipe covering protection saddle. B-Line B3110 with B3160-B3165 series.

B. Pipe Clamps
   1. When flexibility in the hanger assembly is required due to horizontal movement, use pipe clamps with weldless eye nuts, B-Line B3140 or B3142 with B3200. For insulated lines use double bolted pipe clamps, B-Line B3144 or B3146 with B3200.

C. Multiple or Trapeze Hanger
   1. Construct trapeze hangers from 12 gauge roll formed ASTM A1011 SS Grade 33 structural steel channel, 1-5/8 inch by 1-5/8 inch minimum, B-Line B22 strut or stronger as required.
   2. Mount pipes to trapeze with 2 piece pipe straps sized for outside diameter of pipe, B-Line B2000 Series.
   3. For pipes subjected to axial movement:
      a. Strut mounted roller support, B-Line B3126. Use pipe protection shield or saddles on insulated lines.
      b. Strut mounted pipe guide, B-Line B2417.

D. Wall Supports
   1. Pipes 4 inch and smaller:
      a. Carbon steel hook, B-Line B3191.
      b. Carbon steel J-hanger, B-Line B3690.
   2. Pipes larger than 4 inch:
      a. Welded strut bracket and pipe straps, B-Line B3064 and B2000 series.
      b. Welded steel brackets, B-Line B3066 or B3067, with roller chair or adjustable steel yoke pipe roll. B-Line B3120 or B3110. Use pipe protection shield or saddles on insulated lines.

E. Floor Supports
   1. Hot piping under 6 inch and all cold piping:
      a. Carbon steel adjustable pipe saddle and nipple attached to steel base stand sized for pipe elevation. B-Line B3093 and B3088T or B3090 and B3088. Screw or weld pipe saddle to appropriate base stand.
   2. Hot piping 6 inch and larger:
      a. Adjustable Roller stand with base plate, B-Line B3117SL
      b. Adjustable roller support and steel support sized for elevation, B-Line B3124

F. Vertical Supports
   1. Steel riser clamp sized to fit outside diameter of pipe, B-Line B3373.

2. Copper Tubing Supports
    a. Size hangers to fit copper tubing outside diameters.
        1) Adjustable steel swivel ring (band type) hanger, B-Line B3170CT.
        2) Malleable iron ring hanger, B-Line B3198RCT or hinged ring hanger B3198HCT.
        3) Malleable iron split-ring hanger with eye socket, B-Line B3173CT with B3222.
        4) Adjustable steel clevis hanger, B-Line B3104CT.
    b. For supporting vertical runs use epoxy painted or plastic coated riser clamps, B-Line B3373CT or B3373CTC.
    c. For supporting copper tube to strut use epoxy painted pipe straps sized for copper tubing, B-Line B2000 series, or plastic inserted vibration isolation clamps, B-Line BVT series.

G. Plastic Pipe Supports
1. V-Bottom clevis hanger with galvanized 18-gauge continuous support channel, B-Line B3106 and B3106V, to form a continuous support system for plastic pipe or flexible tubing.
2. Supplementary Structural Supports
    a. Design and fabricate supports using structural quality steel bolted framing materials as manufactured by Cooper B-Line. Provide roll formed channels, 12 gauge ASTM A1011 SS Grade 33 steel, 1-5/8 inch by 1-5/8 inch or greater as required by loading conditions. Submit designs for pipe tunnels, pipe galleries, etc., to Architect/Engineer for approval. Use clamps and fittings designed for use with the strut system.

H. Pipe Supports Between Anchors and Pipe Expansion Loops
1. Provide supports between pipe anchors designed to cause minimal resistance to piping movement. Provide roller hanger supports or slide plates between anchors.
2. Provide supports near the L bends of pipe thermal expansion loops. No more than 12 inches from either side of the horizontal elbow.

2.03 SPRING HANGERS

A. For critical high temperature piping, at hanger locations where the vertical movement of the piping is ¾ inch or more, or where it is necessary to avoid the transfer of load to adjacent hangers or connected equipment, provide approved constant support hangers. However, where the piping movement occurs at a hanger supporting a portion of piping riser on which a rigid support is also located, variable spring hangers may be used for any amount of expansion up to the full recommended working range of the spring, provided the change in supporting effect of the variable spring is added to the design load of the rigid support.

B. Where transfer of load to adjacent hangers or equipment is not critical, and where the vertical movement of the piping is less than ¾ inch, variable spring hangers may be used, provided the variation in supporting effect does not exceed 25 percent of the calculated piping load through its total vertical travel.

C. The total travel for constant support hangers shall be equal to actual travel plus 20 percent. In no case shall the difference between actual and total travel be less than one inch.

D. Furnish constant support hangers with travel stops, which shall prevent upward and downward movement of the hanger. The travel stops shall be factory installed so that the hanger level is at the “cold” position. Design the travel stops to permit future re-engagement, even in the event the lever is at a position other than “cold”, without having to make hanger adjustments.

E. For low temperature systems where vertical movements are anticipated, use approved precompressed variable spring hangers.

2.04 UPPER ATTACHMENTS

A. Beam Clamps
1. Use beam clamps where piping is to be suspended from building steel. Select clamp type on the basis of load to be supported, and load configuration.

2. Use center loaded beam clamps where specified. For steel clamps provide B-Line B3050, or B3055. For malleable iron or forged steel beam clamps with cross bolt provide B-Line B3054 or B3291-B3297 Series as required to fit beams.

B. Concrete Inserts
1. Use cast in place spot concrete inserts where applicable; either steel or malleable iron body, B-Line B2500 or B3014. Select spot inserts to allow for lateral adjustment and to have means for attachment to forms. Select inserts to suit threaded hanger rod sizes, B-Line N2500 or B3014N series.
2. Use continuous concrete inserts where applicable. Provide 12 gauge channels, ASTM A1011 SS Grade 33 structural quality carbon steel, complete with Styrofoam inserts and end caps with nail holes for attachment to forms. Provide continuous concrete inserts with a load rating of 2,000 lbs/ft. in concrete, B-Line B22I, 32I, or 52I. Select channel nuts suitable for strut and rod sizes.
3. Provide Drop-In, shell type anchors with an internally threaded, all-steel shell with expansion cone insert and flush embedment lip. Manufacture anchors from plated carbon steel, 18-8 stainless steel and 316 stainless steel. Install anchors with carbide tipped hammer drill bits made in accordance to ANSI B212.15-1994 specifications. Test anchors to ASTM E488 criteria and listed by ICC (formerly ICBO) and SBCCI. Provide anchors listed by the following agencies as required by the local building code: UL, FM. Select inserts to suit threaded hanger rod sizes, Redhead Multi-Set.

2.05 ACCESSORIES

A. Hanger Rods shall be threaded both ends or continuous threaded rods of circular cross section. Use adjusting locknuts at upper attachments and hangers. No wire, chain, or perforated straps are allowed.

B. Provide shields that are 180 degree galvanized sheet metal, 12 inch minimum length, 18 gauge minimum thickness, designed to match outside diameter of the insulated pipe, B-Line B3151.

C. Pipe protection saddles shall be formed from carbon steel, 1/8 inch minimum thickness, sized for insulation thickness. Saddles for pipe sizes greater than 12 inch shall have a center support rib.

2.06 FINISHES

A. Indoor Finishes
1. Coat hangers and clamps for support of bare copper piping with copper colored epoxy paint, B-Line Dura-Copper®. Use additional PVC coating of the epoxy painted hanger where necessary.
2. Zinc plate hangers for other than bare copper pipe in accordance with ASTM B633 OR provide an electro-deposited green epoxy finish, B-Line Dura-Green®.
3. Provide pre-galvanized strut channels in accordance with ASTM A653 SS Grade 33 G90 or provide an electro-deposited green epoxy finish, B-Line Dura-Green®.

B. Outdoor and Corrosive Area Finishes
1. Hot dip galvanize hangers and struts located outdoors after fabrication in accordance with ASTM A123. Provide all hanger hardware as hot dip galvanized or stainless steel. Zinc plated hardware is not acceptable for outdoor or corrosive use.
2. Provide hangers and strut manufactured of type 304 stainless steel with stainless steel hardware where located in corrosive areas.

PART 3 - EXECUTION

3.01 PIPE HANGERS AND SUPPORTS

A. Adequately support pipe by pipe hanger and supports specified in PART 2 PRODUCTS. Allow for forces imposed by expansion joints, satisfy structural requirements and maintain proper clearances with respect to adjacent piping, equipment and structures. Size hangers for insulated pipes sized to accommodate insulation thickness.

B. Keep the different types of hangers to a minimum and provide hangers that are neat, without complicated bolting and with the number of parts of each hanger and its anchor kept to a minimum.

C. Make accurate weight balance calculations to determine the required supporting forces at each hanger or support location and the pipe weight load at each equipment connection.

D. Provide pipe hangers capable of supporting the pipe in all conditions of operation selected to allow free expansion and contraction of the piping, and prevent excessive stress resulting from transferred weight being induced into the pipe or connected equipment.

E. Painted or shop prime all hangers and supports that are not galvanized.

F. Support horizontal steel piping in accordance with MSS SP-58 and NYS 2020 Mechanical Code, excerpts of which follow below:

NOMINAL PIPE SIZE (INCHES)	ROD DIAMETER (INCHES)	MAXIMUM SPACING (FEET)
1/2 to 1-1/4	3/8	7
1-1/2	3/8	9
2	3/8	10
2-1/2	1/2	11
3	1/2	12
3-1/2	1/2	12
4	5/8	12
5	5/8	12
6	3/4	12
8	3/4	12
10	7/8	12
12	7/8	12
14	1	12
16	1	12

G. Support horizontal copper tubing in accordance with MSS SP-58 and NYS 2020 Mechanical Code, excerpts of which follow below:

NOMINAL PIPE SIZE (INCHES)	ROD DIAMETER (INCHES)	MAXIMUM SPACING (FEET)
1/2 to 3/4	3/8	5
1	3/8	6
1-1/4	3/8	7
1-1/2	3/8	8
2	3/8	8
2-1/2	1/2	9
3	1/2	10
3-1/2	1/2	11
4	1/2	12
5	1/2	12
6	5/8	12
8	3/4	12

H. Provide means of preventing dissimilar metal contact such as plastic coated hangers, copper colored epoxy paint, or non adhesive isolation tape- B-Line Iso-pipe. Galvanized felt isolators sized for copper tubing may also be used, B-Line B3195CT.

I. Install hangers to provide a minimum of 1/2 inch space between finished covering and adjacent work.

J. Place a hanger within 12 inches of each horizontal elbow.

K. Support vertical piping independently of connected horizontal piping. Support vertical pipes at every floor. Wherever possible, locate riser clamps directly below pipe couplings or shear lugs.

L. Where several pipes can be installed in parallel and at the same elevation, provide trapeze hangers as specified in section 2.02 C. Space trapeze hangers according to the smallest pipe size, or install intermediate supports according to schedules in this Section.

M. Do not support piping from other pipes, ductwork or other equipment that is not building structure.

N. Where horizontal piping movements are greater than ½ inch, or where the hanger rod angularity from the vertical is greater than four degrees from the cold to hot position of the pipe, offset the hanger pipe and structural attachments in such a manner that the rod is vertical in the hot position.

O. In any part of the building which is steel-framed, attach hangers to the building structural steel beams. Where hangers do not correspond with the building structural steel beams, provide supplemental steel members continuously welded or bolted to the building structural steel beams. Provide two (2) coats of primer on the supplemental steel. In any parts of the building which is a concrete structure, attach hangers to the concrete structure by installing anchors into the concrete.

3.02 CONCRETE INSERTS

A. Secure pipe hangers attached to concrete structure and slabs with embedded inserts, anchor bolts or concrete fasteners. Use a safety factor of 5 in selection of all inserts and expansion bolts unless there are seismic requirements (See “Seismic Restraint” specification if applicable). In which case, the larger of the two loadings shall govern the design.

B. Provide inserts for placement in formwork before concrete is poured.

C. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

D. Where concrete slabs form finished ceilings, provide inserts to be flush with slab surface.

E. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inch.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the marking and identification materials for identifying mechanical equipment, ductwork, and piping systems.

B. Mark and identify all mechanical equipment, ductwork, and piping systems described herein, and as shown and specified in the Contract Documents.

1.02 REFERENCES

A. ANSI A13.1 - Scheme for the Identification of Piping Systems.

B. Z53.1 - Safety Color Code for Marking Physical Hazards.

C. OSHA 29 CFR 1910 - Subpart J, General Environmental Controls

1.03 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include, but not be limited to:
   1. Mechanical System Identification Product Data Submittal
      a. Product Data: Provide the manufacturer's catalog literature for each product required.
      b. Tags: Submit samples of tags, attachments, labeled, and identified.
   2. Identification Scheme
      a. Submit the scheme of identification codes.
      b. Steam Trap Schedule: Submit steam trap schedules listing proposed steam trap number, location, type, sizes, and service.
      c. Valve Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
      d. Equipment Schedules: Submit mechanical equipment schedules, listing proposed equipment numbers, and their location and function.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Seton

B. Bunting

C. W.H. Brady Company

2.02 VALVE TAGS

A. Provide valve tags for all valves installed for this project. Valve tags shall be constructed of brass with stamped letters and service designation tag size minimum 1-1/2 inches (38 mm) diameter with smooth edges, brass S hook.

B. Valve tags shall be permanently stamped and marked with a service designation, normal valve position, and an identifying number as large as possible. Each valve shall have a separate and distinct number coordinated with the service designations shown on the Drawings and the Owners existing valve numbering system. Coordinate with the Architect/Engineer and Owner before finalizing the valve tag numbering system.

2.03 PIPE MARKERS

A. All accessible piping installed indoors for this project, insulated and uninsulated shall be identified with wraparound pipe markers. Pipe markers shall be factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. “Accessible” piping shall include exposed piping, and piping located above lay-in ceilings. Markers shall include system name, flow arrow, and color code and pipe diameter.

B. All piping installed outdoors for this project, insulated and uninsulated, shall be identified with wraparound pipe markers. Pipe markers shall be factory fabricated, flexible, semi-rigid plastic,

preformed to fit around pipe or pipe covering. The marker shall be printed with weather-resistant ink.

C. Where pipes are too small or not readily accessible for application of pipe markers, a brass identification tag at least 1 ½ inches in diameter, with depressed ½ inch high black letters and numerals, shall be securely fastened at locations specified for pipe markers.

D. See pipe marker schedule for size requirements of pipe markers.

2.04 MECHANICAL EQUIPMENT MARKERS

A. Identify all mechanical equipment, bare or insulated, installed in the rooms or on the roof, by means of lettered and numbered nameplate (not stenciled) identifying the equipment and service. Refer to the Drawings for equipment identifications. Nameplates shall be aluminum with permanent 1 ½ inch high white letters on a black background, mechanically affixed and installed in a readily visible location on the equipment. Coordinate the final equipment designation with the Owner.

B. In addition to markers, all mechanical equipment shall be furnished with the manufacturer's identification plate showing the name of equipment, manufacturer's name and address, date of purchase, model number and performance data.

2.05 DUCTWORK IDENTIFICATION

A. Provide full air distribution system identification at each side of a wall penetration, in a mechanical room, at all changes in direction and at no more than 50 foot intervals. Provide arrows identifying direction of flow.

B. Fire damper or Smoke damper access points shall be permanently identified on the exterior by a label having letters not less than 0.5 inch in height reading: SMOKE DAMPER or FIRE DAMPER.

C. Identification shall be preprinted labels.

D. Letter Size: 1-1/2 inches in height.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Apply piping system markers and valve tags in the following locations:
   1. Adjacent to each valve and fitting.
   2. At each branch location and riser take-off
   3. At each side of a pipe passage through floors, walls, ceiling and partitions.
   4. At each pipe passage to and from underground areas.
   5. Every 20 feet on all horizontal and vertical pipe runs.

B. Provide arrow markers showing direction of flow incorporated into or adjacent to each piping system marker. Use double-headed arrows if flow is in both directions.

C. Apply all piping system markers where view is unobstructed; markers and legends shall be clearly visible from operating positions.

D. Apply all tags and piping system markers in accordance with the manufacturer's instructions. Do not attach tags to valve handle such that the normal or emergency operation of the valve will be hindered.

3.02 VALVE CHART

A. Provide valve and steam trap chart identifying each valve's and steam trap's number, size of valve and service.

B. Frame the chart and locate the schedule in the Mechanical Equipment Room. (Aluminum Frame with plastic window).

C. Provide a compact disc that has the valve and steam trap chart schedule in a spreadsheet format. The spreadsheet software to be used for the schedule shall be identified by the Owner.

3.03 LAY IN CEILING TILES AND ACCESS DOORS

A. Provide a lettered and numbered nameplate for each access door indicating the mechanical equipment that the door provides access too.

B. Where VAV boxes, hot water reheat coils, or other mechanical devices are installed above a lay-in ceiling tile system, provide and install color coded thumb tabs to mark the location of the equipment above the ceiling.

3.04 SCHEDULES

A. Pipe Marker Letter Size Schedule:

Outside diameter of insulation or pipe Inches	Letter height Inches	Color field Inches
3/4 to 1-1/4	1/2	8
1-1/2 to 2	3/4	8
2-1/2 to 6	1 - 1/4	12
8 to 10	2 - 1/2	24
Over 10	3 - 1/2	24

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section specifies requirements for testing, adjusting, and balancing of all air and hydronic fluid distribution systems, including the equipment and devices associated with each system.

B. The work includes setting speed and flow, adjusting equipment and devices installed for systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to the mechanical installations specified in other Sections of the Specifications.

1.02 RELATED WORK

A. Drawings and general provisions of the Contract, including General Conditions, any Supplemental Conditions, and Division 01 Specification Sections, govern the work of this section.

1.03 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include, but not be limited to:
   1. Certified Balancing Reports
      a. Testing, adjusting, and balancing agency certification: Submit proof that the testing, adjusting, and balancing agency meets the requirements of Article 1.04 “Quality Assurance” below, and all other specified requirements.
      b. Certified Balancing Reports: Submit certified test reports, signed by the authorized representative of the testing and balancing agency. Certify the reports to be proof that the systems have been tested, adjusted and balanced in accordance with the selected reference standards (NEBB or AABC); are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at completion of the testing, adjusting and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Submittal of test report shall be in the following format:
         1) Draft Report: Upon completion of testing, adjusting and balancing procedures, prepare draft reports on the approved forms. Draft report may be handwritten, but must be complete, factual, accurate and legible. Organize and format draft reports in the same manner specified herein for the final reports. Submit digital (PDF) of draft reports. Only one complete set of draft reports will be returned.
         2) Final Report: Upon verification and approval of draft reports, prepare final reports, type written and organized and formatted as described herein. Submit digital (PDF) of final reports.
            (a) Report Format: Submit reports using the standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted and balanced. Include schematic systems diagrams. Divide the contents into the below listed divisions, separating them by divider pages with titles descriptive of the contents:
               (1) General Information and Summary.
               (2) Air Systems.
               (3) Hydronic Systems.
            (b) Report Contents: Provide the following minimum information, forms and data:
               (1) General Information and Summary: Identify the testing, adjusting and balancing Agency, Contractor, Owner, Architect/Engineer, and Project on the inside cover sheet. Include addresses, and contact names and telephone numbers. Include a certification sheet containing the seal and name, address, telephone number and signature of the Agency’s responsible certified Test and Balance Engineer. Include in this division a listing of the instrumentation used for the procedures, along with the proof of calibrations.
               (2) Include in the remainder of the reports the appropriate forms containing, as a minimum, the information indicated on the standard report forms

prepared by AABC or NEBB, for each item of equipment and system. Prepare a schematic diagram for each item of equipment and system, to accompany each respective report form.

(c) Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards within a period not exceeding six months prior to conducting the test procedures.

(d) Existing Systems: Where existing systems are to be added to or modified include in the report results of operational tests taken prior to modifications including but not limited to existing fan and pump curves, pressure readings and flow measurements. Include in the report copies of the equipment and motor nameplate data along with equipment performance curves indicating operating points prior to any modifications and, where existing equipment is retained, operating points after system balance. Where terminals are adjusted or modified include terminal performance curves/data and final readings.

1.04 QUALITY ASSURANCE

A. Test, adjust and balance systems and equipment by using competent mechanics regularly employed by a testing, adjusting and balancing Subcontractor whose primary business is the testing, adjusting and balancing of building mechanical systems. The testing, adjusting and balancing Subcontractor shall be a business established for a minimum of 10 years.

B. The testing, adjusting, and balancing Subcontractor shall be certified by the Associated Air Balance Council (AABC) or the National Environmental Balancing Bureau (NEBB).

C. Instrumentation type, quantity, and accuracy shall be as described in AABC's "National Standards for Field Measurement and Instrumentation, or Total System Balance, or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

D. All instrumentation shall be calibrated at least every 6 months or more frequently if required by the instrument manufacturer.

1.05 PERFORMANCE REQUIREMENTS

A. Comply with all applicable Federal, State and Local laws, ordinances, regulations and codes, and the latest industry standards including, but not limited to the entities listed below for procedures, measurements, instruments and test reports for testing, adjusting and balancing work:
   1. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
   2. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
   3. National Environmental Balancing Bureau (NEBB)
   4. Associated Air Balance Council (AABC)

B. Set the air delivery or intake of each diffuser, grille and register to be as designed or within five percent of the air flow rates shown on the Drawings.

C. Set the fan air flow rate and static pressure rise across the fan to be within 10 percent above the design value at design speed.

1.06 JOB CONDITIONS

A. Require the testing and balancing specialist to review his/her work with the respective manufacturers of the equipment and devices involved, and coordinate and schedule all work.

B. Furnish and install balancing dampers, pressure taps, gauges, valves, and other components as required for a properly balanced system, whether or not specified herein or shown on the Drawings, all at no additional cost to the Owner. Make all adjustment or replacement parts recommended by the testing and balancing specialist in strict accordance with the respective equipment manufacturer's recommendations.

C. Coordinate with the control manufacturer's representative to set the adjustment of the automatically operated dampers and control valves to operate as required.

1.07 GENERAL

A. The Owner will occupy the building during the entire testing, adjusting, and balancing period. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

B. Complete all tests specified herein to the satisfaction of the Architect/Engineer before final acceptance.

C. The Architect/Engineer, or his representative, is the sole judge of the acceptability of the tests. The Architect/Engineer may direct the performance of any such additional tests, as he deems necessary in order to determine the acceptability of the systems, equipment, material and workmanship. No additional payment will be made for any test required by the Architect/Engineer.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.

B. Obtain copies of approved shop drawings of all air handling and hydronic equipment, air outlets (supply, return and exhaust), manual valves, automatic valves and the temperature control diagrams, including intended sequence of operations.

C. Existing Systems: Where existing systems are to be added to or modified perform operational tests prior to modifications including but not limited to existing fans and pumps curves, pressure readings and flow measurements.

1. Obtain copies of the equipment and motor nameplate data along with equipment performance curves indicating operating points prior to any modifications. Where terminal units are to be adjusted or modified obtain performance data for these units.

D. Examine installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned, and is operable. Do not proceed with testing, adjusting and balancing until unsatisfactory conditions have been corrected in a manner approved by the testing and balancing specialist.

E. Examine the air systems to see that they are free from obstructions. Determine that all dampers and registers are open, moving equipment is lubricated, clean filters are installed, and automatic controls are functioning; and perform other inspections and maintenance activities necessary for proper operation of the systems.

F. Examine the hydronic systems to see that they are free from abnormal obstructions, and that all piping, valves and equipment have been properly made fully operational. Determine that all equipment and control systems are performing correctly by functional testing.

G. Where existing systems are to be modified or added to ensure that all strainers and filters are clean and any operational problems that will prevent system balance have been brought to the attention of the Owner and repaired.

3.02 TESTING, ADJUSTING AND BALANCING

A. Notify the Owner 48 hours in advance of starting any tests. Do not perform any tests until acknowledgment of notification and approval has been received from the Owner.

B. Provide all necessary instruments and personnel for the tests. If, in the opinion of the Architect/Engineer, the results of such tests show that the Work has not complied with the requirements of the Contract Documents, make all additions or changes necessary to put the system in proper working condition and pay all expenses for all subsequent tests which are necessary to determine whether the Work is satisfactory. Any additional work or subsequent tests shall be carried out at the convenience of the Architect/Engineer.

C. Test all packaged equipment in strict accordance with the equipment manufacturer's requirements.

D. Perform any and all other tests that may be required by the local municipality or other governing body, board or agency having jurisdiction.

E. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

F. Actuate all safety devices in a manner that clearly demonstrates their workability and operation.

G. Cut insulation, ductwork and piping for installation of test probes to the minimum extent necessary to allow adequate performance of test procedure.

H. Perform tests and compile test data for all air systems and hydronic systems.

I. Include a schematic diagram locating the air inlets, outlets, fans, equipment, dampers and regulating devices for air systems, and a schematic diagram for location of balancing valves, flow indicators, equipment, and devices for hydronic systems.

J. All instruments used shall be provided by the entity performing the Work of this Section, and shall be accurately calibrated and maintained in good working order.

K. Air Systems

Perform the testing, adjusting and balancing of air systems in accordance with the detailed procedures outlined in the referenced standards; including but not be limited to the following:

1. Test, record and adjust fan rpm to design requirements.
2. Test and record motor full load amperes.
3. Make a pitot tube traverse of main supply ducts and obtain design flow rate at fans.
4. Test and record system static pressure, velocity pressure and total pressure.
5. Test and adjust system for design supply, transfer and return air flow rate.
6. Test and adjust system for minimum and maximum design flow rates of outside air.
7. Test and record return air temperatures.
8. Test and record coil and fan leaving air temperatures.
9. Adjust all main supply, return, relief, and exhaust air ducts to proper design flow rate.
10. Adjust all zones to proper design flow rate for supply, return, transfer, relief and exhaust air.
11. Test and adjust each diffuser, grille and register.
12. Identify each grille, diffuser and register as to location and area on the schematic diagram.
13. Identify and list in the final report size, type and manufacturer of diffusers, grilles and registers and all tested equipment. Use manufacturer's data on all equipment to make required calculations for testing, adjusting and balancing. Include design required velocity and test resultant velocity, required flow rate and test resultant flow rate after adjustment as part of readings and tests of diffusers, grilles and registers.
14. Adjust all diffusers, grilles and registers to minimize drafts in all areas.
15. Permanently mark all dampers after air balance is complete so that they can be restored to their correct position, if disturbed later.
16. Seal openings in ductwork for pitot tube insertion with snap-in plugs after air balance is complete.

L. Hydronic Systems

1. Perform the testing, adjusting and balancing of hydronic systems in accordance with the detailed procedures outlined in the referenced standards; and including but not limited to the following:
    a. Preliminary procedure prior to balancing:
        1) Examine water in system and determine if water has been treated and cleaned.
        2) Check expansion tank to determine that it is not air bound and the system is completely full of water.
        3) Purge all air vents of water systems, check automatic air vents and determine if they are operating properly. Repair or replace any air vents that are not operating properly.

4) Coordinate with control manufacturer for required cooling and heating temperature controls and corresponding, automatic valve operation settings.
5) Open all normally open valves to full open position. Set automatic valves to full coil flow.
6) Complete air balance before final water balance begins.
7) Check water pumps for pump rotation and for proper flow rate delivery against manufacturer's pump curves.
8) Set all balancing valves for required flow delivery at mains and branch mains to cooling and heating elements.
9) Upon completion of flow readings and adjustments of balancing valves, mark all settings and record data, so that they can be restored to their correct "balanced" position, if disturbed later.

b. Include the following as part of the final balancing:
1) After required cooling and heating temperature controls and automatic valve operation settings are made, recheck pump flow requirements and readjust system as required.
2) Record pressure drop through coil at set flow rate of coil for full cooling and for full heating. Set pressure drop across bypass valve to match coil pressure drop.
3) Record and check the following items at each cooling and heating element:
4) Inlet water temperatures and static pressure at connections.
5) Leaving water temperatures and pressure drop of each coil.
6) Flow rate through coil with control valve stroked manually wide open.
7) Record operating suction and discharge pressures of each pump and final total dynamic head and rated amperage versus actual amperage of pump motors.
8) Record entering and leaving water temperatures and flow through all equipment and devices.
9) Check and record all flow rates at all locations in the piping system with flow meters.
10) Upon completion of air and hydronic systems testing, patch insulation, ductwork and housings, using materials identical to those removed.
11) Perform final testing, adjusting and balancing during summer season for air conditioning systems and during winter season for heating systems, including operation when outside conditions are within 5 degrees F wet bulb temperature of maximum summer design condition, and within 10 degrees F dry bulb temperature of minimum winter design condition.
12) Retest, adjust, and balance systems subsequent to system modifications. Resubmit test results.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section describes the insulation, jackets, and accessories for piping as scheduled in Part 3 of this Section and as shown on the Drawings.

1.02 RELATED REQUIREMENTS

A. Section 078413 - Through Penetration Firestopping for HVAC Systems

B. Section 079201 - Non Fire Rated Sleeves and Seals

C. Section 230702 - Firestopping for HVAC

D. Section 232000 - Pipe, Valves, and Fittings

E. Section 232300 - Refrigerant Piping

1.03 REFERENCES

A. National Fire Protection Association (NFPA):
   1. NFPA 255 - Surface Burning Characteristics of Building Materials.

B. New York:
   1. International Energy Conservation Code - 2018
   2. International Mechanical Code - 2018
   3. Mechanical Code of New York State - 2020
   4. Energy Conservation Construction Code - 2020
   5. ASHRAE 90.1 - 2016

C. Greenguard

D. Underwriters Laboratories, Inc. (UL):
   1. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

E. American Society for Testing and Materials (ASTM):
   1. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
   2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
   3. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
   4. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
   5. ASTM C335 - Standard Test Method for Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
   6. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
   7. ASTM C518 - Standard Test Method for Steady-State Heat Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
   8. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
   9. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
   10. ASTM C547 - Standard Specification for Mineral Fiber Preformed Pipe Insulation.
   11. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
   12. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
   13. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing.
   14. ASTM C 591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
   15. ASTM C 610 - Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation.

16. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
17. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
18. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
19. ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
20. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.
21. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
22. ASTM E96 - Standard Test Method for Water Vapor Transmission of Materials.

1.04 DEFINITIONS

A. Greenguard: Greenguard Environmental Institute

B. IAQ: Indoor Air Quality

C. EPA: Environmental Protection Agency.

D. WHO: World Health Organization

E. ASJ: All Service Jacket

F. SSL: Self-Sealing Lap

G. FSK: Foil-Scrim-Kraft; jacketing

H. PSK: Poly-Scrim-Kraft; jacketing

I. PVC: Polyvinyl Chloride

J. FRP: Fiberglass Reinforced Plastic

K. Cold Service Piping/ Surfaces: Pipes or surfaces where the normal operating temperature is 60 degrees F or lower.

L. Hot Service Piping/ Surfaces: Pipes or surfaces where the normal operating temperature is 105 degrees F or higher.

1.05 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Piping Insulation Product Data Submittal
      a. Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
      b. Provide manufacturer's installation instructions that ensure acceptable workmanship and installation standards will be achieved.

1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: Company specializing in manufacturing products specified with minimum 3 years documented experience.
   2. Installer: Company specializing in performing the Work of this Section with minimum 3 years documented experience.

B. Materials:
   1. Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA 255 and UL 723.
   2. Insulation for duct, pipe and equipment for above grade exposed to weather outside building shall be certified as being self-extinguishing for 1" thickness in less than 53 seconds when tested in accordance with ASTM D1692.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

B. Follow manufacturer's recommended storage and handling practices.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient conditions required by manufacturers of each product (tapes, adhesives, mastics, cements, insulation, etc.).

B. Maintain temperature before, during, and after installation for a minimum of 24 hours.

C. Supply fiberglass products that assure excellent IAQ (Indoor Air Quality) performance through Greenguard Certification.

D. Mold: Carefully inspect any insulation that has been exposed to water. If it shows any sign of mold growth remove it from the Site. If the material is wet but shows no sign of mold, dry rapidly and thoroughly. If it shows signs of facing degradation from wetting remove it from the Site.

PART 2 - PRODUCTS

2.01 FIBER GLASS INSULATION

A. Approved Manufacturers:
   1. Knauf Insulation
   2. Johns Manville Corporation
   3. Owens Corning Corporation
   4. CertainTeed Corporation

B. Fiber glass insulation meeting ASTM C547, ASTM C585, and ASTM C795; rigid molded, noncombustible.

C. Factory applied vapor barrier jacket: ASJ/SSL conforming to ASTM C1136 Type I and ASTM E96, secured with self-sealing longitudinal laps and butt strips.

2.02 FIBER GLASS INSULATION JACKETS AND ACCESSORIES

A. Field-Applied Jackets and Fitting Covers
   1. PVC - 25/50 or Indoor/Outdoor, UV-resistant fittings, jacketing and accessories, white or colored. Fitting cover system consisting of pre-molded, high-impact PVC materials with fiber glass inserts. Approved Manufacturer: Proto Corporation.
      a. Thickness: 10 mil.
      b. Closures: stainless steel tacks, matching PVC tape, or PVC adhesive per manufacturer's recommendations.
   2. ASTM B209 formed aluminum, 0.016-inch thick in smooth, corrugated, or embossed finish with factory-applied moisture barrier. Approved Manufacturer: Childers.
      a. Overlap: 2-inch minimum.
      b. Fittings: 0.016-inch thick die-shaped with factory-applied moisture barrier.
      c. Metal jacket bands: 3/8-inch wide, 0.015-inch thick aluminum or 0.010-inch thick stainless steel.
   3. ASTM A666, Type 304 stainless Steel, 0.010-inch thick in smooth, corrugated, or embossed finish with factory-applied moisture barrier. Approved Manufacturer: Childers.
      a. Overlap: 2-inch minimum.
      b. Fittings: 0.016-inch thick die-shaped with factory-applied moisture barrier.
      c. Metal jacket bands: 3/8-inch wide, 0.010-inch thick stainless steel.
   4. Laminated Self-Adhesive Water and Weather Seals - Permanent acrylic self-adhesive System; weather resistant, high puncture and tear resistance; meeting or exceeding requirements of UL 723; applied in strict accordance with manufacturers' recommendations.

B. Fitting Insulation
   1. Pre-formed fiberglass, preformed perlite, mitered fiberglass, mitered perlite or calcium silicate in lieu of PVC systems. Protect fittings with field-applied fitting covers.

C. Tapes

1. Vapor barrier type, self-sealing, non-corrosive, fire-retardant. Approved Manufacturer: Compac Corporation

2.03 ELASTOMERIC INSULATION

A. Approved Manufacturers:
   1. Armacell LLC
   2. K-Flex USA, Inc.

B. Flexible, tubular (Type 1) or sheet/roll form (Type 2) closed-cell elastomeric insulation complying with ASTM C534, Grade 1 - Standard (temperature range(-)297°F to 220°F; use molded tubular material wherever possible.

2.04 ELASTOMERIC INSULATION ACCESSORIES

A. Adhesives:
   1. Air dried, waterproof vapor barrier contact adhesive, compatible with insulation for joining of seams and butt joints.

B. Finishes:
   1. Provide a weather and UV resistant protective finish for outdoor applications in accordance with the manufacturer's recommendations.

2.05 HIGH DENSITY JACKETED INSULATION INSERTS FOR HANGERS AND SUPPORTS

A. For use with Fiberglass Insulation:
   1. Cold Service Piping:
      a. Polyurethane Foam: Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.
   2. Hot Service Piping:
      a. Calcium Silicate: Minimum density 15 pcf, K of 0.50 at 300 degrees F; ASTM C 533.
      b. Perlite: Minimum density 12 pcf, K of 0.60 at 300 degrees F; ASTM C 610.

B. For Use with Flexible Elastomeric Foam Insulation:
   1. Provide to prevent thermal bridging and formation of condensation.
      a. Provide insulated piping supports at clamping points to prevent crushing and cross section area reduction of insulation.
      b. Load bearing PET or closed cell EPDM core.
      c. UV degradation resistant exterior
      d. Outside diameter shall match insulation sizes
      e. Armacell ArmaFix EcoLight, Aeroflex Arefix, or equal

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that all piping is tested and approved prior to insulation installation.

B. Verify that all surfaces are clean, dry and without foreign material before applying insulation materials.

3.02 INSTALLATION (GENERAL)

A. Install all materials using skilled labor regularly engaged in this type of work. Install all materials in strict accordance with manufacturer's recommendations, building codes, and industry standards.

B. Locate insulation and cover seams in the least visible location. Extend all surface finishes in such a manner as to protect all raw edges, ends and surfaces of insulation.

C. On cold surfaces where a vapor retarder must be maintained, apply insulation with a continuous, unbroken moisture and vapor seal. Insulate and vapor seal all hangers, supports, anchors, or other projections secured to cold surfaces to prevent condensation.

D. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

E. For hot piping conveying fluids 140°F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

F. For hot piping conveying fluids over 140°F, insulate flanges and unions at equipment.

G. Maintain continuous pipe insulation through walls, ceiling or floor openings, or sleeves except where firestop or firesafing materials are required.

H. Install insulation neatly, accurately and without voids, in accordance with manufacturer's instructions and NIAC National Commercial and Industrial Insulation Standards.

I. Insulate fittings, valves and flanges using premolded covers with precut insulation inserts.

J. Insulate piping using insulation of type and thickness scheduled in this Section.

K. Install metal shields between hangers or supports and the piping insulation. Install rigid insulation inserts as required between the pipe and the insulation shields. Fabricate inserts to be of equal thickness to the adjacent insulation and vapor seal as required. Insulation inserts shall be no less than the following lengths:

1½" to 2½" IPS	10" long
3" to 6" IPS	12" long
8" to 10" IPS	16" long
12" and over IPS	22" long

L. Pipe exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor) to be finished with PVC jacket and fitting covers, aluminum jacket, or stainless steel jacket.

M. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with polyester film.

N. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with <<aluminum; stainless steel>> jacket with seams located on bottom side of horizontal piping. Coordinate insulation installation with heat-tracing installation and testing. Insulate piping after tracing or heat distribution tape has been installed and tested for continuity.

3.03 INSTALLATION (FIBER GLASS)

A. Provide a continuous vapor retarder on piping operating below ambient temperatures. Seal all joints, seams and fittings.

B. Firmly butt and secure ends with appropriate butt-strip material. On high-temperature piping, double layering with staggered joints when recommended by the insulation manufacturer. When double layering, the inner layer should not be jacketed.

C. Insulated pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

D. Insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.

2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

E. Exterior Applications:
1. Jacket piping and fittings exposed to the elements using aluminum or stainless steel jackets with a factory applied moisture barrier. Hold firmly in place with a friction type Z lock or a minimum 2” overlap joint. Seal all joints completely along the longitudinal seam and install so as to shed water. Seal all circumferential joints by use of preformed butt strips; minimum 2" wide or a minimum 2" overlap. Overlap butt strips to the adjacent jacketing a minimum ½-inch and completely weather seal. Install a 6" to 10" unsealed slide joint every 25 to 30 lineal feet to allow for the thermal expansion of the pipe and jacketing. In addition, apply a thin bead of silicone grease in the overlap to prevent water migration while allowing the joint to slide. Install an unsealed slide joint where distance between fittings exceeds 8 lineal feet.
2. Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness ad adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with <<aluminum; stainless steel>> jacket with seams located on bottom side of horizontal piping.

F. Cold Piping Insulation:
1. On below freezing applications and in high abuse areas protect the ASJ jacket with a PVC vapor retarding outer jacket. Seal exposed ends of the insulation with a vapor retarder mastic installed per the manufacturer’s recommendations. Apply vapor seals at butt joints at every fourth pipe section joint and at each fitting to isolate any water incursion.
2. On chilled water systems operating in conditions of: RH of 90% and above, follow the same guidelines as described above for below freezing applications.

3.04 INSTALLATION (ELASTOMERIC)

A. Piping:
1. Install pipe insulation by slitting tubular sections and applying onto piping or tubing. Alternately, slide unslit sections over the open ends of piping or tubing. Adhere and seal all seams and butt joints using adhesive.
2. Push insulation onto the pipe, never pull. Stretching of insulation may result in open seams and joints.
3. Tape the ends of the tubing before slipping the insulation over the new pipes to prevent dust from entering the pipe.
4. Clean cut all edges. Do not leave rough or jagged edges of the insulation. Use proper tools such as sharp non-serrated knives.
5. On cold piping, adhere insulation directly to the piping at the high end of the run using a two-inch strip of adhesive on the inner diameter of the insulation and on the pipe. Coat all exposed end cuts of the insulation with adhesive. Adhere all penetrations through the insulation and termination to the substrate to prevent condensation migration.
6. Use sheet insulation on all pipes larger than 6-inch diameter. Do not stretch insulation around the pipe. On pipes larger than 12-inch diameter, adhere insulation directly to the pipe on the lower 1/3 of the pipe. On pipes greater than 24-inch diameter, completely adhere insulation.
7. Stagger seams when applying multiple layers of insulation.

B. Valves, Flanges and Fittings:
1. Insulate all fittings with the same insulation thickness as the adjacent piping. Adhere all seams and mitered joints with adhesive. Sleeve screwed fittings and adhere with a minimum 1” overlap onto the adjacent insulation.
2. Insulate valves, flanges, strainers, and Victaulic couplings using donuts covered with sheet or oversized tubular insulation.

C. Hangers:
1. Support piping system using high density inserts with sufficient compressive strength. Apply elastomeric foam insulation with the same or greater thickness than the pipe insulation to pipe supports. Seal all joints with adhesive.

2. Standard and split hangers - Insulate piping supported by ring hangers with the same insulation thickness as the adjacent pipe. Seal all seams and butt joints with adhesive. Sleeve ring hangers using oversized tubular insulation. On cold piping, extend insulation up the hanger rod a distance equal to four times the insulation thickness. Insulation tape may be used to a thickness equal to the adjacent insulation thickness.
3. Clevis hangers or other pipe support systems - Install saddles under all insulated lines at unistrut clamps, clevis hangers, or locations where insulation may be compressed due to the weight of the pipe. Insert and adhere wooden dowels or blocks of a thickness equal to the insulation to the insulation between the pipe and the saddle.
4. Pre-insulated pipe hangers can be used to prevent compression of insulation at standard split, clevis hangers or other pipe support systems. Adhere a pair of non-skid pads to the clamps to minimize the movement. In addition, to prevent loosening of the clamps, use an antivibratory fastener, such as a nylon-locking nut.

D. Exterior Applications:
1. Paint all outdoor exposed piping with two coats of UV resistant finish. Prior to applying the finish, wipe the insulation with denatured alcohol. Do not tint the finish.
2. Locate seams for all outdoor exposed piping on the lower half of the pipe.

3.05 PIPING INSULATION MATERIAL SCHEDULE

SYSTEM OR SERVICE	LOCATION	INSULATION TYPE	JACKET
HEATING HOT WATER	INSIDE	FIBER GLASS	ALL SERVICE JACKET
HEATING HOT WATER	INSIDE	FIBER GLASS	ALL SERVICE JACKET
HEATING HOT WATER	OUTSIDE	FIBER GLASS	ALUMINUM JACKET
HEATING HOT WATER	OUTSIDE	FIBER GLASS	ALUMINUM JACKET
CHILLED WATER	INSIDE	CELLULAR GLASS	ALL SERVICE JACKET
CHILLED WATER	INSIDE	CELLULAR GLASS	ALL SERVICE JACKET
CHILLED WATER	OUTSIDE	CELLULAR GLASS	ALUMINUM JACKET
CHILLED WATER	OUTSIDE	CELLULAR GLASS	ALUMINUM JACKET
CONDENSATE DRAINS	INSIDE	ELASTOMERIC	
HVAC REFRIGERANT LINES	INSIDE	ELASTOMERIC	
HVAC REFRIGERANT LINES	OUTSIDE	ELASTOMERIC	EXTERIOR COATING
STEAM (LPS) TO 15 PSIG.	INSIDE	FIBER GLASS	ALL SERVICE JACKET
STEAM (LPS) TO 15 PSIG.	INSIDE	FIBER GLASS	ALL SERVICE JACKET
STEAM CONDENSATE	INSIDE	FIBER GLASS	ALL SERVICE JACKET
STEAM CONDENSATE	INSIDE	FIBER GLASS	ALL SERVICE JACKET
STEAM CONDENSATE	OUTSIDE	FIBER GLASS	ALUMINUM JACKET
STEAM CONDENSATE	OUTSIDE	FIBER GLASS	ALUMINUM JACKET

DOMESTIC COLD WATER	INSIDE	FIBER GLASS	ALL SERVICE JACKET
DOMESTIC HOT WATER	INSIDE	FIBER GLASS	ALL SERVICE JACKET

3.06 MINIMUM PIPING INSULATION THICKNESS (IN.)

FLUID OPERATING TEMP. RANGE (°F)	SYSTEMS IN TEMP. RANGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (IN.)				
		CONDUCTIVITY BTU*IN./(H*SQ. FT.*°F)	MEAN RATING TEMP (°F)	<1	1 TO < 1-1/2	1-1/2 TO < 4	4 TO < 8	=8
> 350		0.32-0.34	250	4.5	5.0	5.0	5.0	5.0
251-350		0.29-0.32	200	3.0	4.0	4.5	4.5	4.5
201-250		0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
141-200		0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105-140		0.21-0.28	100	1.0	1.0	1.5	1.5	1.5
40-60		0.21-0.27	75	0.5	0.5	1.0	1.0	1.0
< 40		0.20-0.26	50	0.5	1.0	1.0	1.0	1.5

END OF SECTION 230700

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes:
   1. Penetrations in floor-ceiling assemblies.
   2. Penetrations in roof-ceiling assemblies.
   3. Penetrations in walls and partitions.
   4. Penetrations in smoke barriers.
   5. Construction enclosing compartmentalized areas.

1.03 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:

B. Firestopping for HVAC Product Data Submittal
   1. Product Data: For each type of through-penetration firestop system product indicated.
   2. System Drawings: Submit documentation from a qualified third-party testing agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
   3. Product Certificates: Certificate of conformance signed by manufacturers of through-penetration firestop system products certifying that products comply with requirements.

1.04 QUALITY ASSURANCE

A. Provide through-penetration firestop systems that comply with the following requirements and those specified in “Performance Criteria” Article:
   1. Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
   2. Through-penetration firestop system products bear classification marking of qualified testing and inspection agency.

B. Engage an experienced installer who is certified, licensed or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products per specified requirements. A manufacturer’s willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualifications on buyer.

C. Obtain through-penetration firestop systems for each type of penetration and construction condition indicated from a single manufacturer.

D. Conduct conference at Project site to comply with requirements in Division 01.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturer’s labels identifying product and manufacturer, date of manufacture; lot number; shelf life, if applicable; qualified testing and inspection agency’s classification marking; and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes.

1.06 PROJECT CONDITIONS

A. Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limitations recommended by manufacturer.

B. Do not install through-penetration firestop systems when substrates are wet due to rain, frost, condensation, or other causes.

C. Do not use materials that contain flammable solvents.

1.07 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes or cut openings to accommodate through-penetration firestop systems.

C. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

PART 2 - PRODUCTS

2.01 FIRESTOPPING, GENERAL

A. Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Provide components for each through-penetration firestop system that are needed to install fill materials. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

2.02 PERFORMANCE CRITERIA

A. Fire Test Requirements:
   1. Underwriters Laboratories, Inc. (UL):
      a. UL 1479, “Fire Tests of Through Penetration Firestops”.
      b. UL 263, “Fire Tests of Building Construction and Materials”.
      c. UL 723, “Surface Burning Characteristics of Building Materials”.
   2. American Society of Testing and Materials (ASTM):
      a. ASTM E814, “Fire Tests of Through Penetration Fire Stops”.
      b. ASTM E119, “Fire Tests of Building Construction and Materials”.
      c. ASTM E84, “Surface Burning Characteristics of Building Materials”.

B. References:
   1. Underwriters Laboratories (UL); “Fire Resistance Directory.”
      a. Through Penetration Firestop Systems (XHEZ)
      b. Fill, Void or Cavity Materials (XHHW)
      c. Firestop Devices (XHJI)
      d. Forming Materials (XHKU)
   2. All major building codes:
      a. International Building Code published by ICC.
   3. National Fire Protection Association (NFPA); “NFPA 101: Life Safety Code”.

C. Performance Requirements:
   1. Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.
   2. Provide firestop sealants sufficiently flexible to accommodate motion such as pipe vibration, water hammer, thermal expansion and other normal building movement without damage to the seal.
   3. Pipe insulation shall not be removed, cut away or otherwise interrupted through wall or floor openings. Provide products appropriately tested for the thickness and type of insulation utilized.
   4. Penetrants passing through fire-resistance rated floor-ceiling assemblies contained within chase wall assemblies shall be protected with products tested by being fully exposed to the

fire outside of the chase wall. Systems within the UL Fire Resistance Directory that meet this criterion are identified with the words “Chase Wall Optional.”

5. Provide through-penetration firestop systems subjected to an air leakage test conducted in accordance with the Standards, UL 1479 for penetration firestop systems, with published L-Ratings for ambient and elevated temperatures as evidence of the ability of the firestop system to restrict the movement of smoke.

2.03 MANUFACTURERS

A. Subject to compliance with through-penetration firestop systems (XHEZ) listed in Volume 2 of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:
   1. Acceptable Manufacturer: Specified Technologies Inc., 210 Evans Way, Somerville, NJ 08876. Tel: (800) 992-1180, Fax: (908) 526-9623, Email: specseal@stifirestop.com, Website: www.stifirestop.com.
   2. Approved Equals by Hilti, 3M, and Johns Manville.

B. Single Source: Obtain firestop systems for each type of penetration and construction condition indicated only from a single manufacturer.

2.04 MATERIALS

A. General: Use only through-penetration firestop system products that have been tested for specific fire-resistance-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Latex Sealants: Single component latex formulations that upon cure do not re-emulsify during exposure to moisture, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal Series SSS Intumescent Sealant
   2. Specified Technologies, Inc. (STI) SpecSeal Series LCI Intumescent Sealant
   3. Specified Technologies, Inc. (STI) SpecSeal Series LC Endothermic Sealant

C. Firestop Devices: Factory-assembled steel collars lined with intumescent material sized to fit specific outside diameter of penetrating item, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal Series SSC Firestop Collars
   2. Specified Technologies, Inc. (STI) SpecSeal Series LCC Firestop Collars

D. Firestop Putty: Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal Series SSP Firestop Putty

E. Wrap Strips: Single component intumescent elastomeric strips faced on both sides with a plastic film, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal Series RED2 Wrap Strip
   2. Specified Technologies, Inc. (STI) SpecSeal Series BLU2 Wrap Strip

F. Firestop Pillows: Re-enterable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame retardant poly bag, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal Series SSB Firestop Pillows

G. Mortar: Portland cement based dry-mix product formulated for mixing with water at Project site to form a non-shrinking, water-resistant, homogenous mortar, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal Series SSM Firestop Mortar

H. Silicone Sealants: Moisture curing, single component, silicone elastomeric sealant for horizontal surfaces (pourable or nonsag) or vertical surface (nonsag), the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal SIL300 Silicone Firestop Sealant
   2. Specified Technologies, Inc. (STI) SpecSeal SIL300SL Self-Leveling Silicone Firestop Sealant

I. Composite Sheet: Intumescent material sandwiched between a galvanized steel sheet and steel wire mesh protected with aluminum foil, the following products are acceptable:

1. Specified Technologies, Inc. (STI) SpecSeal CS Composite Sheet

J. Cast-In-Place Firestop Device: Single component molded firestop device installed on forms prior to concrete placement with totally encapsulated, tamper-proof integral firestop system and smoke sealing gasket. Device shall allow for a concrete floor thickness of minimum 2-1/2 inches up to 36 inches without the use of field applied extension tubing. The following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal CID Cast-In Firestop Device

K. Fire-Rated HVAC Retaining Angles: Steel angle system with integral intumescent firestop gasket for use on steel HVAC ducts, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal FyreFlange Firestop Angles

PART 3 - EXECUTION

3.01 PREPARATION

A. Examination of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

B. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellents, and any other substances that may inhibit optimum adhesion.

C. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

D. Do not proceed until unsatisfactory conditions have been corrected.

3.02 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General Requirements: Install through-penetration firestop systems in accordance with “Performance Criteria” Article and in accordance with the conditions of testing and classification as specified in the published design.

B. Manufacturer’s Instructions: Comply with manufacturer’s instructions for installation of through-penetration firestop systems products.
   1. Seal all openings or voids made by penetrations to ensure an air and water-resistant seal.
   2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of through-penetration firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
   3. Protect materials from damage on surfaces subjected to traffic.

3.03 FIELD QUALITY CONTROL

A. Inspections: Owner shall engage a qualified independent inspection agency to inspect through-penetration firestop systems.

B. Keep areas of work accessible until inspection by authorities having jurisdiction.

C. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.04 ADJUSTING AND CLEANING

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed openings to be free of excess through-penetration firestop system materials and soiling as work progresses.

END OF SECTION 230702

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:
   1. Roof curbs - See Rooftop Unit specification for additional requirements for a custom sound roof curb.
   2. Equipment supports.
   3. Pipe curb assemblies, pipe chase housings, or pipe portals.
   4. Pipe mounting pedestals.

B. Related Sections include the following:
   1. Section 077200 - Roof Accessories - Hatches, Supports, and Curbs.
   2. Section 077210 - Non-Penetrating Rooftop Support Systems.
   3. Section 230548 - Vibration Isolation and Seismic/Wind Restraints.

1.03 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Roof Accessories for HVAC Systems Product Data Submittal
      a. Product Data: For each type of product indicated. Include construction details, materials, dimensions of individual components and profiles, and finishes.
   2. Roof Accessories for HVAC Systems Shop Drawings
      a. Shop Drawings: Show fabrication and installation details. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other Work.
   3. Roof Accessories for HVAC Systems Coordination Drawings
      a. Coordination Drawings: Roof plans drawn to scale and coordinating penetrations and roof-mounted items. Show the following:
         1) Size and location of roof accessories specified in this Section.
         2) Method of attaching roof accessories to roof or building structure.
         3) Other roof-mounted items including mechanical and electrical equipment, piping, and conduit.

1.04 QUALITY ASSURANCE

A. Standards: Comply with the following:
   1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.
   2. NRCA's "Roofing and Waterproofing Manual" details for installing units.

1.05 ROOF WARRANTY

A. All work performed in connection with new equipment on roof shall be performed and installed in accordance with roof manufacturer's recommendations. Contractor shall pay for and arrange for services of authorized representative of roofing manufacturer to inspect all work affecting roof and shall obtain statement of continuation of roof warranty from manufacturer. Contractor shall submit all roof work to architect and obtain approval.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Roof Curbs, Equipment Supports, Pipe Curb Assemblies or Pipe Portals, Pipe Mounting Pedestals, Duct Mounting Pedestals:
      a. Custom Curb, Inc.

b. Pate Co. (The).
c. Roof Products & Systems (RPS) Corporation.
d. ThyCurb, Inc.

2.02 MATERIALS, GENERAL

A. Aluminum Sheet: ASTM B 209 for alclad alloy 3005H25 or alloy and temper required to suit forming operations, with mill finish, unless otherwise indicated.

B. Extruded Aluminum: ASTM B 221 alloy 6063-T52 or alloy and temper required to suit structural and finish requirements, with mill finish, unless otherwise indicated.

C. Galvanized Steel Sheet: ASTM A 653/A 653M with G90 coating designation; commercial quality, unless otherwise indicated.
   1. Structural Quality: Grade 40, where indicated or as required for strength.

D. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M with Class AZ-50 coating, structural quality, Grade 40, or as required for strength.

E. Insulation: Manufacturer's standard rigid or semirigid glass-fiber board of thickness indicated.

F. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, complying with AWPA C2; not less than 1-1/2 inches thick.

G. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.
   1. Where removing exterior exposed fasteners affords access to building, provide nonremovable fastener heads.

H. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.

I. Bituminous Coating: SSPC-Paint 12, solvent-type bituminous mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coating.

J. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

K. Elastomeric Sealant: Generic type recommended by unit manufacturer that is compatible with joint surfaces; ASTM C 920, Type S, Grade NS, Class 25, and Uses NT, G, A, and, as applicable to joint substrates indicated, O.

L. Roofing Cement: ASTM D 4586, nonasbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

2.03 VIBRATION ISOLATION AND SEISMIC/WIND RESTRAINTS

A. Roof curbs, equipment supports, and roof accessories shall comply with all the additional requirements described in mechanical specification section for Vibration Isolation and Seismic Restraints. The roof accessory manufacturer shall provide a letter of guarantee from their Engineering Department stamped and certified (as described in the Vibration Isolation and Seismic Restraint specification) stating that the seismic restraints are in full compliance with these specifications.

2.04 ROOF CURBS

A. General: Provide roof curbs capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

B. Fabrication: Unless otherwise indicated or required for strength, fabricate units from minimum 0.0747-inch-thick, structural-quality, hot-dip galvanized or aluminum-zinc alloy-coated steel sheet; factory primed and prepared for painting with welded or sealed mechanical corner joints.

C. Fabrication: Unless otherwise indicated or required for strength, fabricate units from minimum 0.063-inch-thick, sheet aluminum with welded corner joints.

1. Provide preservative-treated wood nailers at tops of curbs and formed flange at perimeter bottom for mounting to roof.
2. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
3. Provide manufacturer's standard rigid or semirigid insulation.
4. Provide formed cants and base profile coordinated with roof insulation thickness.
5. Fabricate units to minimum height of 12 inches, unless otherwise indicated.
6. Sloping Roofs: Where slope of roof deck exceeds 1/4 inch per foot, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.

2.05 EQUIPMENT SUPPORTS

A. General: Provide equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

B. Fabrication: Unless otherwise indicated or required for strength, fabricate units from minimum 0.0747-inch-thick, structural-quality, hot-dip galvanized or aluminum-zinc alloy-coated steel sheet; factory primed and prepared for painting with welded or sealed mechanical corner joints.

C. Fabrication: Unless otherwise indicated or required for strength, fabricate units from minimum 0.063-inch-thick, sheet aluminum with welded corner joints.
   1. Provide preservative-treated wood nailers at tops of curbs and formed flange at perimeter bottom for mounting to roof.
   2. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
   3. Fabricate units to minimum height of 8 inches, unless otherwise indicated.
   4. Sloping Roofs: Where slope of roof deck exceeds 1/4 inch per foot, fabricate support units with height tapered to match slope to level tops of units.

2.06 PIPE CURB ASSEMBLIES, PIPE CHASE HOUSINGS, OR PIPE PORTALS

A. Manufacturers:
   1. Custom Curb, Inc.
   2. Pate Co. (The).
   3. Roof Products & Systems (RPS) Corporation.
   4. ThyCurb, Inc.
   5. Sigrist.

B. The pipe curb assembly or pipe portal shall include a prefabricated roof curb, a laminated acrylic coated ABS (Acrylonitrile Butadiene Styrene) plastic curb cover with prepunched mounting holes and molded sealing ring on the collared opening, and an EPDM compression molded rubber cap for use with a variety of piping combinations. Each cap shall have a stainless-steel clamp for each pipe penetration. The maximum pipe size shall be 12-inch diameter.

C. Curb covers shall be resistant to ozone and ultraviolet rays and shall have a serviceable temperature range of -40 degrees F to +250 degrees F. The molded sealing ring on the collared opening and the groove in the rubber cap shall be installed to assure a weather-tight pressure and mechanical seal. The protective rubber caps shall have a serviceable temperature range of –60 degrees F to +250 degrees F and shall be resistant to ozone and ultraviolet rays. The conical shaped steps of the nipple shall provide a weatherproof seal around the penetration. The stainless steel snaplock clamps shall provide added protection to guarantee the seal.

D. The roof curb shall include 18-gauge steel construction with integral base plate, continuously welded corner seams, factory-installed wood nailer, and 1.5-inch, 3 lb. rigid fiberglass insulation.

2.07 PIPE MOUNTING PEDESTALS

A. The pipe mounting pedestal shall include an equipment rail (standard 24-inch long for single pipe support), a single 24-inch long steel slide channel attached to “U” shaped mounting brackets and secured to side of equipment rail with lag bolts supplied. The pipe roller assembly shall have galvanized 18-inch long continuous threaded rods to give 12-inch vertical adjustments, galvanized removable pipe retainer bracket, cast iron pipe rollers and lateral adjust spacer bracket for 12-inch horizontal adjustment.

2.08 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. 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.

2.09 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Conversion-Coated and Factory-Primed Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below).
   1. Organic Coating: Air-dried primer of not less than 2.0-mil dry film thickness.

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

D. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 606.1 or AAMA 608.1.
   1. Color: As selected by Architect from the full range of industry colors and color densities.

E. 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 specifications for cleaning, conversion coating, and painting.
   1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 603.8 except with a minimum dry film thickness of 1.5 mils, medium gloss.
   2. Color: As selected by Architect from manufacturer's full range.

F. 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 manufacturers' written instructions.
   1. Fluoropolymer Three-Coat System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight.
      a. For Spray Application: Comply with ASCA 96.
      b. For Coil-Coated Sheets: Comply with AAMA 620.
      c. Color and Gloss: As selected by Architect from manufacturer's full range.

2.10 GALVANIZED STEEL SHEET FINISHES

A. Surface Preparation: Clean surfaces with nonpetroleum 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.
   1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

B. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply the air-dried primer specified below immediately after cleaning and pretreating.
   1. Shop Primer: Exterior galvanized metal primer per Division 9 Section "Painting."

C. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

D. High-Performance Organic Finish: Cleaned and primed with inhibitive primer and organic coating as specified below. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   1. Fluoropolymer Three-Coat System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 621 for coil-coated sheets.
      a. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Comply with manufacturer's written instructions. Coordinate installation of roof accessories with installation of roof deck, roof insulation, flashing, roofing membranes, penetrations, equipment, and other construction involving roof accessories to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight. Anchor roof accessories securely to supporting structural substrates so they are capable of withstanding lateral and thermal stresses, and inward and outward loading pressures.

B. For all rooftop supports (including pipe, conduit, and/or ductwork), install as per roof support manufacturer's instructions and roof manufacturer's instructions (to maintain existing roof warranty). Install every 10 feet minimum and every change in direction.

C. Installation shall also comply with the specification section for Vibration Isolation and Seismic Restraints.

D. Roof curbs and equipment rails shall be level at the top with pitch built-in when deck slopes ¼ of an inch per foot or greater.

E. Equipment Rails shall span a minimum of two (2) joists and not cantilever more than 6-inches.

F. Pipe mounting pedestals shall be mounted on top of deck over every other bar joist or not more than 10 feet on center.

G. Install roof accessory items according to construction details of NRCA's "Roofing and Waterproofing Manual," unless otherwise indicated.

H. Separation: Separate metal from incompatible metal or corrosive substrates, including wood, by coating concealed surfaces, at locations of contact, with bituminous coating or providing other permanent separation.

I. Flange Seals: Unless otherwise indicated, set flanges of accessory units in a thick bed of roofing cement to form a seal.

J. Cap Flashing: Where required as component of accessory, install cap flashing to provide waterproof overlap with roofing or roof flashing (as counterflashing). Seal overlap with thick bead of mastic sealant.

K. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

3.02 CLEANING AND PROTECTION

A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.

END OF SECTION 230703

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section describes the insulation, jackets and insulating accessories for sheet metal ductwork as scheduled in Part 3 of this Section and as shown on the Drawings.

1.02 REFERENCES

A. National Fire Protection Association (NFPA):
   1. NFPA 255 - Surface Burning Characteristics of Building Materials.

B. New York:
   1. International Energy Conservation Code - 2018
   2. International Mechanical Code - 2018
   3. Mechanical Code of New York State - 2020
   4. Energy Conservation Construction Code - 2020
   5. ASHRAE 90.1 - 2016

C. Greenguard

D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

E. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

F. Underwriters Laboratories, Inc. (UL):
   1. UL 723 - Surface Burning Characteristics of Building Materials.

G. American Society for Testing and Materials (ASTM):
   1. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
   2. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
   3. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
   4. ASTM C553 - Mineral Fiber Blanket and Felt Insulation.
   5. ASTM C612 - Specification for Mineral Fiber Block and Board Thermal Insulation.
   6. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel
   7. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
   8. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
   9. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
   10. ASTM E84 - Surface Burning Characteristics of Building Materials.
   11. ASTM E96 - Water Vapor Transmission of Materials.

1.03 DEFINITIONS

A. Greenguard: Greenguard Environmental Institute

B. IAQ: Indoor Air Quality

C. EPA: Environmental Protection Agency

D. WHO: World Health Organization

E. ASJ: All Service Jacket

F. SSL: Self-Sealing Lap

G. FSK: Foil-Scrim-Kraft; jacketing

H. PSK: Poly-Scrim-Kraft; jacketing

I. PVC: Polyvinyl Chloride

J. FRP: Fiberglass Reinforced Plastic

K. Cold Piping/Ductwork/Surfaces: Pipes or surfaces where the normal operating temperature is 60 degrees F or lower.

1.04 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Ductwork Insulation Product Data Submittal
      a. Product data: To include product description, manufacturer's installation instructions, types and recommended thicknesses for each application, and location of materials.
      b. Provide samples and mock-ups of systems as required.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient conditions required by manufacturers of tapes, adhesives, mastics, cements, and insulation materials.

B. Follow manufacturer’s recommended handling practices.

C. Supply fiberglass products that assure excellent IAQ (Indoor Air Quality) performance through Greenguard Certification.

D. Mold: Carefully inspect any insulation that has been exposed to water. If it shows any sign of mold growth remove it from the Site. If the material is wet but shows no sign of mold, dry rapidly and thoroughly. If it shows signs of facing degradation from wetting remove it from the Site. Discard air handling insulation used in the air stream if exposed to water.

1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: Company specializing in manufacturing Products specified with minimum 3 years documented experience.
   2. Installer: Company specializing in performing the Work of this Section with minimum 3 years documented experience.

B. Materials:
   1. Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA 255 and UL 723.
   2. Certify insulation for duct, pipe and equipment for above grade exposed to weather outside building as being self-extinguishing for 1" thickness in less than 53 seconds when tested in accordance with ASTM D1692.

PART 2 - PRODUCTS

2.01 FIBERGLASS DUCT WRAP

A. Flexible Fiber Glass Blanket meeting ASTM C553 Types I, II and III, and ASTM C1290; Greenguard compliant.

B. Factory Applied Vapor Retarder Jacket: FSK or PSK conforming to ASTM C1136 Type II.

C. Maximum service temperature of 250º F (Faced) or 350° F (Unfaced).

D. Density:
   1. Concealed areas: Minimum 0.75 PCF.
   2. Exposed areas: Minimum 1.0 PCF.

E. Approved Products:
   1. Friendly Feel Duct Wrap by Knauf

2.02 FIBERGLASS RIGID BOARD

A. Rigid Fiber Glass Board insulation meeting ASTM C612 Type IA and IB.

B. Mean temperature by ASTM C177 and a maximum service temperature of 450º F.

C. Factory Applied Vapor Retarder Jacket: ASJ conforming to ASTM C1136 Type I, or FSK or PSK conforming to ASTM C1136 Type II.

D. Density:
   1. Concealed areas: Minimum 3 PCF
   2. Exposed areas: Minimum 6 PCF

E. Approved Products:
   1. Insulation Board by Knauf

2.03 ACOUSTIC DUCT LINER

A. Conforming to ASTM C1071 Type 1 and NFPA 90A & 90B.

B. Noise Reduction Coefficient (NRC): ASTM C423 Type A Mounting, 0.40 or higher for ½" product, 0.60 or higher for 1" product.

C. Density: 1.5 or 2.0 PCF per application / thickness

D. Rated for a maximum air velocity of 6,000 Feet per minute.

E. Approved Products:
   1. Performance+ by Knauf or approved equal.

2.04 FIBERGLASS INSULATION ACCESSORIES

A. Aluminum Jacket - 0.016-inch (0.406 mm) thick in smooth, corrugated, or embossed finish with factory applied moisture barrier. Overlap 2-inch (50 mm) minimum.

B. Laminated Self-Adhesive Water and Weather Seals - apply per manufacturers' recommendations.

C. Tapes - Vapor barrier type, self-sealing, non-corrosive, fire-retardant. Approved Manufacturer: Compac Corporation

D. Adhesives - Approved Manufacturer: Foster

E. Mastic - Approved Manufacturer: Foster

F. Vapor Barrier Coating - Approved Manufacturer: Foster

2.05 SHEET WATERPROOFING MEMBRANE

A. Prefabricated, self-adhering, sheet-type waterproofing membrane shall be FlexClad-400 by MFM Building Products Corp. or approved equal.

B. Description:
   1. Top Layer: Stucco-embossed, UV-resistant aluminum weathering surface.
   2. Middle Layer: Multiple layers of high-density cross-linked polymer film.
   3. Bottom Layer: Uniform layer of rubberized asphalt adhesive, protected by disposable silicone release paper.

C. Color: As selected by Architect/Engineer.

D. Material Thickness: ASTM D1970/D1970M, 40 mils Nominal

E. Flexibility: ASTM D1970/D1970M, Pass.

F. Vapor Permeance: ASTM E96/E96M, 0 perms.

G. Nail Sealability: ASTM D1970/D1970M, Pass.

H. Heat Aging: ASTM D 794, Pass.

I. Tear Resistance: ASTM D 1424, Average: 660 grams.

J. Ultimate Elongation MD: ASTM D412, 434 percent.

K. Ultimate Elongation CMD: ASTM D412, 246 percent.

L. Low Temperature Flexibility: 1,000,000 Cycles at -10 Degrees F, 1,200 Cycles at -20 Degrees F, No cracking.

M. Flame Spread Index: ASTM E84, 0.

N. Smoke Density Index: ASTM E84, 5.

O. Wind-Driven Rain: SFBC TAS-110-95, 100 mph, No leakage or failure.

P. UV Stability: Excellent.

Q. Accessories: MFM Spray Adhesive

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that all ductwork is tested and approved prior to insulation installation.

B. Verify that all surfaces are clean, dry and without foreign material before applying insulation materials.

3.02 DUCTWORK REQUIRING INSULATION

A. Insulate Ductwork as specified in the DUCTWORK INSULATION SCHEDULE.
   1. Insulate any additional ductwork or plenums indicated to be insulated on the Drawings.

3.03 INSTALLATION (GENERAL)

A. Install all materials using skilled labor regularly engaged in this type of work. Install all materials in strict accordance with manufacturer's recommendations, building codes, and industry standards.

B. Locate insulation and cover seams in the least visible location. Extend all surface finishes in such a manner as to protect all raw edges, ends and surfaces of insulation.

C. On cold surfaces where a vapor retarder must be maintained, apply insulation with a continuous, unbroken moisture and vapor seal. Insulate and vapor seal all hangers, supports, anchors, or other projections secured to cold surfaces to prevent condensation.

D. Install insulation neatly, accurately and without voids, in accordance with manufacturer's instructions and NIAC National Commercial and Industrial Insulation Standards.

E. Install ductwork hanger supports on the outside of the insulation. Where vertical ducts are supported to the building structure, insulate the ductwork supports to prevent condensation.

F. Insulate ductwork using insulation of the type and thickness scheduled at the end of this Section.

G. If specified insulation board thickness does not cover ductwork standing seams and reinforcing angles, insulate them by adhering a grooved strip of fiberglass board with a thickness at least 1 ½ inches greater than the height of the seam or angle covered over the standing seam or angle.

3.04 ACOUSTIC DUCT LINER

A. Apply Duct Lining in strict accordance with the latest edition of SMACNA's "HVAC Duct Construction Standard Metal & Flexible" and NAIMA's "Fibrous Glass Duct Liner Standard".

B. Select length of mechanical fasteners in accordance with the manufacturer's recommendation as listed on each product. Install mechanical fasteners perpendicular to the duct surface, and such that the pin does not compress the liner more than 1/8 inch relative to the nominal thickness of the insulation.

C. Adhesive shall conform to ASTM C916. Apply adhesive to the sheet metal with a 90% minimum coverage. Coat all exposed edges of the duct liner with the same adhesive. Repair all rips and tears using an adhesive that conforms to ASTM C916.

D. Cover all internal duct areas with duct liner. Firmly butt transverse joints with no gaps and coat with adhesive. Overlap and compress longitudinal corner joints.

E. Apply metal nosing to upstream leading edge of transverse edges to additionally secure the insulation.

3.05 FIBERGLASS WRAP INSULATION

A. Apply external duct wrap per insulation schedule even where internally lined.

B. Install Duct Wrap to obtain specified R-value using a maximum compression of 25%.

C. Firmly butt all joints.

D. Overlap the longitudinal seam of the vapor retarder a minimum of 2 inches.

E. Where vapor retarder performance is required, repair all penetrations and damage to the facing using pressure-sensitive foil tape or mastic prior to system startup.

F. Use pressure-sensitive foil tapes a minimum 3 inches wide and apply by moving pressure using a squeegee or other appropriate sealing tool.

G. Additionally secure Duct Wrap to the bottom of rectangular ductwork over 24 inches wide using mechanical fasteners on 18-inch centers. Do not over-compress insulation during installation.

H. Overlap unfaced Duct Wrap a minimum of 2 inches and fasten using 4-inch to 6-inch nails or skewers spaced 4 inches apart, or secured with a wire/banding system. Do not damage the Duct Wrap.

3.06 FIBERGLASS BOARD INSULATION

A. Fit insulation by scoring, cutting and mitering to fit the contour of the ductwork.

B. Attach insulation to ductwork in thickness scheduled by brushing adhesive uniformly on all sides of ductwork covering 100 percent of ductwork surface. Press insulation into place, making complete contact with adhesive. Butt edges of insulation board tightly together without gaps.

C. Additionally, hold insulation in place by impaling on pins welded to all four sides of the ductwork. Locate and weld pins a minimum 12 inch on center with a minimum of 2 rows per side of duct and no less than 3 inches from the edges of the ductwork. Secure insulation to pins with 1 inch diameter hold-down washers. As an alternate to welded pins, provide “Gripnail” mechanical surface fasteners by Gripnail Corporation using pneumatic hammer designed for this work.

D. Seal all joints, seams, breaks, and punctures in facing with adhesive and cover with 3 inch wide sealing tape. Flash supports with vapor barrier coating.

E. For rectangular ducts and plenums exposed to weather, pitch ductwork or insulation board minimum ¼ inch per foot to prevent rainwater from accumulating on top of duct or plenum. Cover insulation board with Sheet Waterproofing Membrane.

3.07 SHEET WATERPROOFING MEMBRANE

A. Surface Preparation:
   1. Prepare surfaces in accordance with manufacturer’s instructions.
   2. Ensure tops of ducts have sufficient slope to eliminate ponding water.
   3. Ensure bottoms of ducts have foil-faced rigid insulation boards installed.
   4. Ensure surfaces are clean and dry.
   5. Remove dirt, dust, oil, grease, hand oils, processing lubricants, moisture, frost, and other contaminants that could adversely affect adhesion of waterproofing membrane.
   6. Prime metal, concrete, and masonry surfaces with primers approved by waterproofing membrane manufacturer.

B. Application:
   1. Apply waterproofing membrane in accordance with manufacturer’s instructions on all exterior insulated ductwork and at locations indicated on the Drawings.
   2. Apply membrane to clean, dry, primed metal ductwork and foil-faced rigid insulation boards. Do not apply over wet or non-rigid insulation.
   3. Apply membrane in accordance with manufacturer’s air, material, and surface temperature requirements.
   4. Apply firm, uniform pressure with hand roller to entire membrane to ensure proper adhesion. Concentrate pressure at seams and on underside of ductwork.
   5. Apply membrane to ducts in accordance with manufacturer’s instructions.
   6. Apply membrane shingle fashion to shed water over, not against laps.
   7. Do not terminate membrane on bottom of duct.
   8. Apply minimum 3-inch laps and minimum 6-inch end laps for ductwork applications.
   9. Embed membrane to bottom of ducts over 24 inches wide in light continuous layer of adhesive applied to insulation face.

10. Apply membrane to bottom of insulated ducts over 36 inches wide using mechanical attachment, in addition to adhesive, in accordance with manufacturer's instructions. Install pints on 12-inch centers with rows staggered.
11. Apply adhesive to areas where special adhesion requirements exist, including duct bottoms, flashings, transitions, joints, elbows, valves, tees, and other fittings.

C. Protection:
1. Protect applied waterproofing membrane and fabric flexible duct connections from damage during construction.

3.08 DUCTWORK INSULATION SCHEDULE

A. Fiber Glass Insulation Schedule:

Ductwork System	Type	Minimum R-Value
Supply Ducts and Plenums, Concealed	Fiberglass Duct Wrap	6
Return Ducts and Plenums, Concealed	Fiberglass Duct Wrap	6
Supply and Return Ducts and Plenums, Exposed in the Space Served	Uninsulated	NA
Supply and Return Ducts and Plenums, Exposed Other Than in the Space Served	Fiberglass Rigid Board	6
Outdoor Air Intake Ducts, Indoors	Fiberglass Rigid Board	6
Ducts Located Outdoors	Fiberglass Rigid Board	8
Unused Portions of Louvers	Louver Blank Off Panels	As Specified
Ductwork Upstream and Downstream of Air Handling Units and Supply and Return Fans, Located Indoors	Internal Acoustic Duct Lining	Note 1, 2
Ductwork Upstream and Downstream of Air Handling Units and Supply and Return Fans, Located Outdoors	Internal Acoustic Duct Lining	Note 1, 2
General Exhaust Ducts Except as Noted	Uninsulated	NA

Notes:
1. Ductwork to be provided with 1-inch internal acoustic lining in addition to externally applied insulation in accordance with the table above.
2. Unless noted otherwise on drawings, duct liner shall be continuous, extending from air handling unit/fan sections out for a linear distance of 20'.

END OF SECTION 230719

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. All work of this Division shall be coordinated and provided by the single Building Management System (BMS) Contractor.

B. The work of this Division shall be scheduled, coordinated, and interfaced with the associated work of other trades. Reference the Division 23 Sections for details.

C. The work of this Division shall be as required by the Specifications, Point Schedules and Drawings.

D. If the BMS Contractor believes there are conflicts or missing information in the project documents, the Contractor shall promptly request clarification and instruction from the design team.

1.02 BMS DESCRIPTION

A. The Building Management System (BMS) shall be a complete system designed for use with the enterprise IT systems. This functionality shall extend into the equipment rooms. Devices residing on the automation network located in equipment rooms and similar shall be fully IT-compatible devices that mount and communicate directly on the IT infrastructure in the facility. Contractor shall be responsible for coordination with the owner's IT staff to ensure that the BMS will perform in the owner's environment without disruption to any of the other activities taking place on that LAN.

B. All points of user interface shall be on standard PCs that do not require the purchase of any special software from the BMS manufacturer for use as a building operations terminal. The primary point of interface on these PCs will be a standard Web Browser.

C. Servers shall be used for the purpose of providing a location for extensive archiving of system configuration data, and historical data such as trend data and operator transactions. All data stored will be through the use of a standard data base platform: Microsoft SQL Server Express or Microsoft SQL Server as dictated elsewhere in this specification.

D. The work of the single BMS Contractor shall be as defined individually and collectively in all Sections of this Division specification together with the associated Point Sheets and Drawings and the associated interfacing work as referenced in the related documents.

E. The BMS work shall consist of the provision of all labor, materials, tools, equipment, software, software licenses, software configurations and database entries, interfaces, wiring, tubing, installation, labeling, engineering, calibration, documentation, samples, submittals, testing, commissioning, training services, permits and licenses, transportation, shipping, handling, administration, supervision, management, insurance, temporary protection, cleaning, cutting and patching, warranties, services, and items, even though these may not be specifically mentioned in these Division documents which are required for the complete, fully functional and commissioned BMS.

F. Provide a complete, neat and workmanlike installation. Use only manufacturer employees who are skilled, experienced, trained, and familiar with the specific equipment, software, standards and configurations to be provided for this Project.

G. The BMS as provided shall incorporate, at minimum, the following integrated features, functions and services:
   1. Operator information, alarm management and control functions.
   2. Enterprise-level information and control access.
   3. Information management including monitoring, transmission, archiving, retrieval, and reporting functions.
   4. Diagnostic monitoring and reporting of BMS functions.
   5. Offsite monitoring and management access.
   6. Energy management
   7. Standard applications for terminal HVAC systems.
   8. BACnet integration to the Variable Refrigerant Flow Equipment

1.03 QUALITY ASSURANCE

A. General
   1. The Building Management System Contractor shall be a manufacturer-owned branch office of a recognized national manufacturer that is regularly engaged in the engineering, programming, installation and service of total integrated Building Management Systems.
   2. Quality Management Program
      a. Designate a competent and experienced employee to provide BMS Project Management. The designated Project Manger shall be empowered to make technical, scheduling and related decisions on behalf of the BMS Contractor. At minimum, the Project Manager shall:
         1) Manage the scheduling of the work to ensure that adequate materials, labor and other resources are available as needed.
         2) Manage the financial aspects of the BMS Contract.
         3) Coordinate as necessary with other trades.
         4) Be responsible for the work and actions of the BMS workforce on site.

1.04 WORK BY OTHERS

A. BMS RESPONSIBILITY MATRIX: The demarcation of work and responsibilities between the BMS Contractor and other related trades shall be as outlined in the BMS RESPONSIBILITY MATRIX:

WORK	FURNISH	INSTALL	LOW VOLT. WIRING / TUBE	LINE POWER
BMS LOW VOLTAGE WIRING	BMS	BMS	BMS	N/A
BMS COMMUNICATIONS BUS WIRING	BMS	BMS	BMS	N/A
BMS CONDUITS AND RACEWAY	BMS	BMS	BMS	BMS
AUTOMATIC DAMPERS	BMS	HVAC CONTR.	N/A	N/A
AUTOMATIC VALVES	HVAC CONTR.	HVAC CONTR.	BMS	N/A
PIPE INSERTION DEVICES AND TAPS INCLUDING THERMOWELLS, FLOW AND PRESSURE STATIONS	BMS	HVAC CONTR.	BMS	BMS
BMS CURRENT SWITCHES	BMS	BMS	BMS	N/A
BMS CONTROL RELAYS	BMS	BMS	BMS	N/A
ALL BMS NODES, EQUIPMENT, HOUSINGS, ENCLOSURES AND PANELS	BMS	BMS	BMS	ELECT. CONTR.
PACKAGED RTU NETWORK THERMOSTATS	BMS	BMS	BMS	ELECT. CONTR
PACKAGED RTU FACTORY-MOUNTED CONTROLS	HVAC CONTR.	HVAC CONTR.	HVAC CONTR.	ELECT. CONTR.

1.01 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Shop Drawings, Product Data, and Samples Submittal

a. List of all shop drawings: The BMS contractor shall submit a list of all shop drawings with submittals dates within 30 days of contract award.
b. Submittals shall be in defined packages. Each package shall be complete and shall only reference itself and previously submitted packages. The packages shall be as approved by the Architect and Engineer for Contract compliance.
c. Allow 15 working days for the review of each package by the Architect and Engineer in the scheduling of the total BMS work.
d. Equipment and systems requiring approval of local authorities must comply with such regulations and be approved. Filing shall be at the expense of the BMS Contractor where filing is necessary. Provide a copy of all related correspondence and permits to the Owner.
e. Index of all submittals and shop drawings: Prepare an index of all submittals and shop drawings for the installation. Index shall include a shop drawing identification number, Contract Documents reference and item description.
f. The BMS Contractor shall correct any errors or omissions noted in the first review.
g. At a minimum, submit the following:
    1) BMS network architecture diagrams: including all nodes and interconnections.
    2) Systems schematics, sequences and flow diagrams.
    3) Points schedule: for each point in the BMS, including: Point Type, Object Name, Expanded ID, Display Units, Controller type, and Address.
    4) Graphic Display screen types and associated menus: Submit samples.
    5) Detailed Bill of Material: List for each system or application, identifying quantities, part numbers, descriptions, and optional features.
    6) Control Damper Schedule: Including a separate line for each damper provided under this section and a column for each of the damper attributes, including: Code Number, Fail Position, Damper Type, Damper Operator, Duct Size, Damper Size, Mounting, and Actuator Type.
    7) Details of all BMS interfaces and connections: to the work of other trades.
    8) Product data sheets or marked catalog pages including part number, photo and description for all products including software.

1.02 RECORD DOCUMENTATION

A. Operation and Maintenance Manuals
1. Three (3) copies of the Operation and Maintenance Manuals shall be provided to the Owner's Representative upon completion of the project. The entire Operation and Maintenance Manual shall be furnished on Compact Disc media, and include the following for the BMS provided:
    a. Table of contents.
    b. As-built system record drawings. Computer Aided Drawings (CAD) record drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal.
    c. Manufacturer’s product data sheets or catalog pages for all products including software.
    d. System Operator’s manuals.
    e. Archive copy of all site-specific databases and sequences.
    f. BMS network diagrams.
    g. Interfaces to all third-party products and work by other trades.
    h. The Operation and Maintenance Manual CD shall be self-contained, and include all necessary software required to access the product data sheets. A logically organized table of contents shall provide dynamic links to view and print all product data sheets. Viewer software shall provide the ability to display, zoom, and search all documents.
2. On-Line documentation: After completion of all tests and adjustments the contractor shall provide a copy of all as-built information and product data to be installed on a customer designated computer workstation or server

1.03 WARRANTY

A. BMS Standard Material and Labor Warranty:
   1. Provide a one-year labor and material warranty on the BMS.
   2. If within twelve (12) months from the date of acceptance of product, upon written notice from the owner, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the BMS Contractor at the cost of the BMS Contractor.
   3. Maintain an adequate supply of materials within 100 miles of the Project site such that replacement of key parts and labor support, including programming. Warranty work shall be done during BMS Contractor's normal business hours.

PART 2 - PRODUCTS

2.01 LARGE GENERAL DESCRIPTION

A. Building Management System (BMS): The Building Management System (BMS) shall use an open architecture and fully support a multi-vendor environment. To accomplish this effectively, the BMS shall support open communication protocol standards and integrate a wide variety of third-party devices and applications. The system shall be designed for use on the Internet, or intranets using off the shelf, industry standard technology compatible with other owner provided networks.

B. The Building Management System shall consist of the following:
   1. Standalone Network Automation Engine(s)
   2. Field Equipment Controller(s)
   3. Input/Output Module(s)
   4. Local Display Device(s)
   5. Distributed User Interface(s)
   6. Network processing, data storage and communications equipment
   7. Other components required for a complete and working BMS
   8. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, controllers and operator devices, while re-using existing controls equipment.
   9. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution.
      a. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.
      b. The System shall maintain all settings and overrides through a system reboot.
   10. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution.

2.02 BMS ARCHITECTURE

A. Automation Network
   1. The automation network shall be based on a PC industry standard of Ethernet TCP/IP. Where used, LAN controller cards shall be standard "off the shelf" products available through normal PC vendor channels.
   2. The BMS shall network multiple user interface clients, automation engines, system controllers and application-specific controllers. Provide one (1) application and data system server for long term data storage that also permits up to five (5) simultaneous system users.
   3. All BMS devices on the automation network shall be capable of operating at a communication speed of 100 Mbps, with full peer-to-peer network communication.
   4. Network Automation Engines (NAE) and Network Control Engines (NCE) shall reside on the automation network.
   5. The automation network will be compatible with other enterprise-wide networks. Where indicated, the automation network shall be connected to the enterprise network and share resources with it by way of standard networking devices and practices.

B. Control Network

1. Network Automation Engines (NAE) and Network Control Engines (NCE) shall provide supervisory control over the control network and shall be capable of supporting both of the following communication protocols as required:
   a. BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9
   b. LonWorks enabled devices using the Free Topology Transceiver (FTT-10a).
2. The Network Engines shall be BACnet Testing Labs (BTL) certified and carry the BTL Label. The NAE shall be tested and certified as a BACnet Building Controller (B-BC).
3. Control networks shall provide either “Peer-to-Peer,” Master-Slave, or Supervised Token Passing communications, and shall operate at a minimum communication speed of 9600 baud.
4. DDC Controllers shall reside on the control network.
5. Control network communication protocol shall be BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135. LonWorks is only acceptable for third party integration where the third party device is unable to communicate using BACnet protocol.
6. A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided for each controller device (master or slave) that will communicate on the BACnet MS/TP Bus.
7. The PICS shall be submitted prior to contract award, when requested, as a condition of award. Otherwise, they shall be part of the project submittal package.

C. Integration
   1. BACnet Protocol Integration - BACnet
      a. The neutral protocol used between systems shall be either BACnet over Ethernet and comply with the ASHRAE BACnet standard 135-2008 or BACnet MS/TP communicating at 38,400 baud.
      b. A complete Protocol Implementation Conformance Statement (PICS) shall be provided for all BACnet system devices.
      c. The ability to command, share point object data, change of state (COS) data and schedules between the host and BACnet systems shall be provided.

2.03 USER INTERFACE

A. Dedicated Web Based User Interface
   1. The BMS Contractor shall provide and install on the maintenance manager’s personal computer the ability for command entry, information management, network alarm management, and database management functions for the BMS. All real-time control functions, including scheduling, history collection and alarming, shall be resident in the BMS Network Automation Engines to facilitate greater fault tolerance and reliability.
   2. Dedicated User Interface Architecture - The architecture of the computer shall be implemented to conform to industry standards, so that it can accommodate applications provided by the BMS Contractor and by other third party applications suppliers, including but not limited to Microsoft Office Applications. Specifically it must be implemented to conform to the following interface standards.
      a. Latest version of an internet browser for user interface functions
      b. Microsoft Office Professional for creation, modification and maintenance of reports, sequences other necessary building management functions
      c. Microsoft Outlook or other e-mail program for supplemental alarm functionality and communication of system events, and reports
      d. Required network operating system for exchange of data and network functions such as printing of reports, trends and specific system summaries

B. Distributed Web Based User Interface
   1. All features and functions of the dedicated user interface previously defined in this document shall be available on any computer connected directly or via a wide area or virtual private network (WAN/VPN) to the automation network and conforming to the following specifications.
   2. The software shall run on wired and wireless network, on PC, laptop, tablet or smartphone, using Microsoft Edge or latest applicable browser supporting the following functions:

a. Configuration
b. Commissioning
c. Data Archiving
d. Monitoring
e. Commanding
f. System Diagnostics

C. Site Management User Interface Application Components
1. Operator Interface
a. An integrated browser based client application shall be used as the user operator interface program.
b. The System shall employ an event-driven rather than a device polling methodology to dynamically capture and present new data to the user.
c. All Inputs, Outputs, Setpoints, and all other parameters as defined within Part 3, shown on the design drawings, or required as part of the system software, shall be displayed for operator viewing and modification from the operator interface software.
d. The user interface software shall provide help menus and instructions for each operation and/or application.
e. The system shall support customization of the UI configuration and a home page display for each operator.
f. The system shall support user preferences in the following screen presentations:
1) Alarm
2) Trend
3) Display
4) Applications
g. All controller software operating parameters shall be displayed for the operator to view/modify from the user interface. These include: setpoints, alarm limits, time delays, PID tuning constants, run-times, point statistics, schedules, and so forth.
h. The Operator Interface shall incorporate comprehensive support for functions including, but not necessarily limited to, the following:
1) User access for selective information retrieval and control command execution
2) Monitoring and reporting
3) Alarm, non-normal, and return to normal condition annunciation
4) Selective operator override and other control actions
5) Information archiving, manipulation, formatting, display and reporting
6) BMS internal performance supervision and diagnostics
7) On-line access to user HELP menus
8) On-line access to current BMS as-built records and documentation
9) Means for the controlled re-programming, re-configuration of BMS operation and for the manipulation of BMS database information in compliance with the prevailing codes, approvals and regulations for individual BMS applications
i. The system shall support a list of application programs configured by the users that are called up by the following means:
1) The Tools Menu
2) Hyperlinks within the graphics displays
3) Key sequences
j. The operation of the control system shall be independent of the user interface, which shall be used for operator communications only. Systems that rely on an operator workstation to provide supervisory control over controller execution of the sequences of operations or system communications shall not be acceptable.
2. Navigation Trees
a. The system will have the capability to display multiple navigation trees that will aid the operator in navigating throughout all systems and points connected. At minimum provide a tree that identifies all systems on the networks.

b. Provide the ability for the operator to add custom trees. The operator will be able to define any logical grouping of systems or points and arrange them on the tree in any order. It shall be possible to nest groups within other groups. Provide at minimum 5 levels of nesting.
c. The navigation trees shall be “dockable” to other displays in the user interface such as graphics. This means that the trees will appear as part of the display, but can be detached and then minimized to the Windows task bar. A simple keystroke will reattach the navigation to the primary display of the user interface.

3. Alarms
   a. Alarms shall be routed directly from Network Automation Engines to PCs and servers. It shall be possible for specific alarms from specific points to be routed to specific PCs and servers. The alarm management portion of the user interface shall, at the minimum, provide the following functions:
      1) Log date and time of alarm occurrence.
      2) Generate a “Pop-Up” window, with audible alarm, informing a user that an alarm has been received.
      3) Allow a user, with the appropriate security level, to acknowledge, temporarily silence, or discard an alarm.
      4) Provide an audit trail on hard drive for alarms by recording user acknowledgment, deletion, or disabling of an alarm. The audit trail shall include the name of the user, the alarm, the action taken on the alarm, and a time/date stamp.
      5) Provide the ability to direct alarms to an e-mail address or alphanumeric pager. This must be provided in addition to the pop up window described above. Systems that use e-mail and pagers as the exclusive means of annunciating alarms are not acceptable.
      6) Any attribute of any object in the system may be designated to report an alarm.
   b. The BMS shall annunciate diagnostic alarms indicating system failures and non-normal operating conditions.
   c. The BMS shall allow a minimum of 4 categories of alarm sounds customizable through user defined wav.files.
   d. The BMS shall annunciate application alarms at minimum, as required by Part 3.
4. Reports and Summaries
   a. Reports and Summaries shall be generated and directed to the user interface displays, with subsequent assignment to printers, or disk. As a minimum, the system shall provide the following reports:
      1) All points in the BMS
      2) All points in each BMS application
      3) All points in a specific controller
      4) All points in a user-defined group of points
      5) All points currently in alarm
      6) All points locked out
      7) All user defined and adjustable variables, schedules, interlocks and the like.
   b. Summaries and Reports shall be accessible via standard UI functions and not dependent upon custom programming or user defined HTML pages.
   c. Selection of a single menu item, tool bar item, or tool bar button shall print any displayed report or summary on the system printer for use as a building management and diagnostics tool.
   d. Provide the capability to view, command and modify large quantities of similar data in tailored summaries created online without the use of a secondary application like a spreadsheet. Summary definition shall allow up to seven user defined columns describing attributes to be displayed including custom column labels. Up to 100 rows per summary shall be supported. Summary viewing shall be available over the network using a standard Web browser.
5. Schedules

a. A graphical display for time-of-day scheduling and override scheduling of building operations shall be provided. At a minimum, the following functions shall be provided:
   1) Weekly schedules
   2) Exception Schedules
   3) Monthly calendars
b. Weekly schedules shall be provided for each group of equipment with a specific time use schedule.
c. It shall be possible to define one or more exception schedules for each schedule including references to calendars
d. Monthly calendars shall be provided that allow for simplified scheduling of holidays and special days for a minimum of five years in advance. Holidays and special days shall be user-selected with the pointing device or keyboard, and shall automatically reschedule equipment operation as previously defined on the exception schedules.
e. Changes to schedules made from the User Interface shall directly modify the Network Automation Engine schedule database.
f. Schedules and Calendars shall comply with ASHRAE SP135/2008 BACnet Standard.
g. Selection of a single menu item or tool bar button shall print any displayed schedule on the system printer for use as a building management and diagnostics tool.
h. Software shall be provided to configure and implement optimal start and stop programming based on existing indoor and outdoor environmental conditions as well as equipment operating history

6. Password
   a. Multiple-level password access protection shall be provided to allow the user/manager to user interface control, display, and database manipulation capabilities deemed appropriate for each user, based on an assigned password.
   b. Each user shall have the following: a user name (accept 24 characters minimum), a password (accept 12 characters minimum), and access levels.
   c. The system shall allow each user to change his or her password at will.
   d. When entering or editing passwords, the system shall not echo the actual characters for display on the monitor.
   e. A minimum of six levels of access shall be supported individually or in any combination as follows:
      1) Level 1 = View Data
      2) Level 2 = Command
      3) Level 3 = Operator Overrides
      4) Level 4 = Database Modification
      5) Level 5 = Database Configuration
      6) Level 6 = All privileges, including Password Add/Modify
   f. A minimum of 100 unique passwords shall be supported.
   g. Operators shall be able to perform only those commands available for their respective passwords. Display of menu selections shall be limited to only those items defined for the access level of the password used to log-on.
   h. Operators shall be further limited to only access, command, and modify those buildings, systems, and subsystems for which they have responsibility. Provide a minimum of 100 categories of systems to which individual operators may be assigned.
   i. The system shall automatically generate a report of log-on/log-off and system activity for each user. Any action that results in a change in the operation or configuration of the control system shall be recorded, including: modification of point values, schedules or history collection parameters, and all changes to the alarm management system, including the acknowledgment and deletion of alarms.
7. Screen Manager
   a. The User Interface shall be provided with screen management capabilities that allow the user to activate, close, and simultaneously manipulate a minimum of 4 active display windows plus a network or user defined navigation tree.

8. Dynamic Color Graphics
    a. The graphics application program shall be supplied as an integral part of the User Interface. Browser or Workstation applications that rely only upon HTML pages shall not be acceptable.
    b. The graphics applications shall include a create/edit function and a runtime function. The system architecture shall support an unlimited number of graphics documents (graphic definition files) to be generated and executed.
        1) The graphics shall be able to display and provide animation based on real-time data that is acquired, derived, or entered.
    c. Graphics runtime functions - A maximum of 16 graphic applications shall be able to execute at any one time on a user interface or workstation with 4 visible to the user. Each graphic application shall be capable of the following functions:
        1) All graphics shall be fully scalable
        2) The graphics shall support a maintained aspect ratio.
        3) Multiple fonts shall be supported.
        4) Unique background shall be assignable on a per graphic basis.
        5) The color of all animations and values on displays shall indicate the status of the object attribute.
        6) Graphics that represent buildings or systems shall allow natural links and transitions between related detailed tabular views of data that compliment the graphic.
    d. Operation from graphics - It shall be possible to change values (setpoints) and states in system controlled equipment directly from the graphic.
    e. Floor Plan graphics - The user interface shall provide graphic applications that summarize conditions on a floor. Floor plan graphics shall indicate thermal comfort using dynamic colors to represent zone temperature deviations from zone setpoint(s). Floor plan graphics shall display overall metrics for each zone in the floor.
    f. Aliasing - Many graphic displays representing part of a building and various building components are exact duplicates, with the exception that the various variables are bound to different field values. Consequently, it shall be possible to bind the value of a graphic display to aliases, as opposed to the physical field tags.
    g. Graphic editing tool - A graphic editing tool shall be provided that allows for the creation and editing of graphic files. The graphic editor shall be capable of performing/defining all animations, and defining all runtime binding.
        1) The graphic editing tool shall provide a library of standard HVAC equipment, floor plan, lighting, security and network symbols.
        2) The graphic editing tool shall provide for the creation and positioning of library symbols by dragging from tool bars or drop-downs and positioning where required.
        3) The graphics editing tool shall permit the importing of AutoCAD drawings for use in the system.
        4) The graphic editing tool shall be able to add additional content to any graphic by importing images in the SVG, PNG or JPG file formats.
9. Historical trending and data collection
    a. Each Automation Engine shall store trend and point history data for all analog and digital inputs and outputs, as follows:
        1) Any point, physical or calculated, may be designated for trending. Two methods of collection shall be allowed:
            (a) Defined time interval
            (b) Upon a change of value
            (c) Each Automation Engine shall have the capability to store multiple samples for each physical point and software variable based upon available memory, including an individual sample time/date stamp. Points may be assigned to multiple history trends with different collection parameters.

b. Trend and change of value data shall be stored within the engine and uploaded to a dedicated trend database or exported in a selectable data format via a provided data export utility. Uploads to a dedicated database shall occur based upon one of the following: user-defined interval, manual command, or when the trend buffers are full. Exports shall be as requested by the user or on a time scheduled basis.

10. Trend data viewing and analysis
    a. Provide a trend viewing utility that shall have access to all database points.
    b. It shall be possible to retrieve any historical database point for use in displays and reports by specifying the point name and associated trend name.
    c. The trend viewing utility shall have the capability to define trend study displays to include multiple trends
    d. Displays shall be able to be single or stacked graphs with on-line selectable display characteristics, such as ranging, color, and plot style.
    e. Display magnitude and units shall both be selectable by the operator at any time without reconfiguring the processing or collection of data. This is a zoom capability.
    f. Display magnitude shall automatically be scaled to show full graphic resolution of the data being displayed.
    g. The Display shall support the user's ability to change colors, sample sizes, and types of markers.
11. Database Management
    a. Where a separate SQL database is utilized for information storage the System shall provide a Database Manager that separates the database monitoring and managing functions by supporting two separate windows.
    b. Database secure access shall be accomplished using standard SQL authentication including the ability to access data for use outside of the Building Automation application.
    c. The database managing function shall include summarized information on trend, alarm, event, and audit for the following database management actions:
        1) Backup
        2) Purge
        3) Restore
    d. The Database Manager shall support four tabs:
        1) Statistics - shall display Database Server information and Trend, Alarm (Event), and Audit information on the Databases.
        2) Maintenance - shall provide an easy method of purging records from the Server trend, alarm (event), and audit databases by supporting separate screens for creating a backup prior to purging, selecting the database, and allowing for the retention of a selected number of day's data.
        3) Backup - Shall provide the means to create a database backup file and select a storage location.
        4) Restore - shall provide a restricted means of restoring a database by requiring the user to log into an Expert Mode in order to view the Restore screen.
    e. The Status Bar shall appear at the bottom of all Database Manager Tabs and shall provide information on the current database activity. The following icons shall be provided:
        1) Ready
        2) Purging Record from a database
        3) Action Failed
        4) Refreshing Statistics
        5) Restoring database
        6) Shrinking a database
        7) Backing up a database
        8) Resetting internet information Services
        9) Starting the Device Manager

10) Shutting down the Device Manager
11) Action successful

f. The Database Manager monitoring functions shall be accessed through the Monitoring Settings window and shall continuously read database information once the user has logged in.

g. The System shall provide user notification via taskbar icons and e-mail messages when a database value has exceeded a warning or alarm limit.

h. The Monitoring Settings window shall have the following sections:
1) General - Shall allow the user to set and review scan intervals and start times.
2) Email - Shall allow the user to create and review e-mail and phone text messages to be delivered when a Warning or Alarm is generated.
3) Warning - shall allow the user to define the Warning limit parameters, set the Reminder Frequency, and link the e-mail message.
4) Alarm - shall allow the user to define the Alarm limit parameters, set the Reminder Frequency, and link the e-mail message.
5) Database login - Shall protect the system from unauthorized database manipulation by creating a Read Access and a Write Access for each of the Trend, Alarm (Event) and Audit databases as well as an Expert Mode required to restore a database.

i. The Monitoring Settings Taskbar shall provide the following informational icons:
1) Normal - Indicates by color and size that all databases are within their limits.
2) Warning - Indicates by color and size that one or more databases have exceeded their Warning limit.
3) Alarm - Indicates by color and size that one or more databases have exceeded their Alarm limit.

j. The System shall provide user notification via Taskbar icons and e-mail messages when a database value has exceeded a warning or alarm limit.

2.04 NETWORK AUTOMATION ENGINES (NAE)

A. The Network Automation Engine (NAE) shall be a fully user-programmable, supervisory controller. The NAE shall monitor the network of distributed application-specific controllers, provide global strategy and direction, and communicate on a peer-to-peer basis with other Network Engines.

B. Automation network - The NAE shall reside on the automation network and shall support a subnet of system controllers.

C. User Interface - Each NAE shall have the ability to deliver a web based User Interface (UI) as previously described. All computers connected physically or virtually to the automation network shall have access to the web based UI.

D. The web based UI software shall be imbedded in the NAE. Systems that require a local copy of the system database on the user's personal computer are not acceptable.

E. Network Automation Engines supporting 100 or fewer field controllers shall support a minimum of two (2) concurrent users. Network Engines with multiple field buses or supporting more than 100 field controllers shall support a minimum of four (4) concurrent users.

F. The web based user shall have the capability to access all system data through one NAE.

G. Remote users connected to the network through an Internet Service Provider (ISP) or telephone dial up shall also have total system access through one NAE.

H. Systems that require the user to address more than one NAE to access all system information are not acceptable.

I. The NAE shall have the capability of generating web based UI graphics. The graphics capability shall be imbedded in the NAE.

J. Systems that support UI Graphics from a central database or require the graphics to reside on the user's personal computer are not acceptable.

K. The web based UI shall support the following functions:
   1. Configuration
   2. Commissioning
   3. Data Archiving
   4. Monitoring
   5. Commanding
   6. System Diagnostics
      a. Systems that require workstation software or modified web browsers are not acceptable.
      b. The NAE shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems.
      c. Processor - The NAE shall be microprocessor-based with a minimum word size of 32 bits. The NAE shall be a multi-tasking, multi-user, and real-time digital control processor. Standard operating systems shall be employed. NAE size and capability shall be sufficient to fully meet the requirements of this Specification.
      d. Memory - Each NAE shall have sufficient memory to support its own operating system, databases, and control programs, and to provide supervisory control for all control level devices.
      e. Hardware Real Time Clock - The NAE shall include an integrated, hardware-Based, real-time clock.
      f. Communications Ports - Network Automation Engines supporting 100 or fewer field controllers shall provide the following ports for operation of operator Input/Output (I/O) devices, such as industry-standard computers, modems, and portable operator's terminals.
         1) USB port
         2) URS-232 serial data communication port
         3) RS-485 port
         4) Ethernet port
   7. Network Automation Engines with multiple field buses or supporting more than 100 field controllers shall provide the following ports for operation of operator Input/Output (I/O) devices, such as industry-standard computers, modems, and portable operator's terminals.
      a. Two (2) USB port
      b. Two (2) URS-232 serial data communication port
      c. Two (2) RS-485 port
      d. One (1) Ethernet port
   8. Diagnostics - The NAE shall continuously perform self-diagnostics, communication diagnosis, and diagnosis of all panel components. The Network Automation Engine shall provide both local and remote annunciation of any detected component failures, low battery conditions, or repeated failures to establish communication.
   9. Power Failure - In the event of the loss of normal power, The NAE shall continue to operate for a user adjustable period of up to 10 minutes after which there shall be an orderly shutdown of all programs to prevent the loss of database or operating system software.
   10. During a loss of normal power, the control sequences shall go to the normal system shutdown conditions. All critical configuration data shall be saved into Flash memory.
   11. Upon restoration of normal power and after a minimum off-time delay, the controller shall automatically resume full operation without manual intervention through a normal soft-start sequence.
   12. Certification - The NAE shall be listed by Underwriters Laboratories (UL).

2.05 NETWORK CONTROL ENGINE (NCE)

A. The Network Control Engine (NCE) shall meet all of the programming, supervisory and communications requirements of the Network Automation Engine described above plus provide the additional features and capabilities described below.

B. The Network Control Engine (NCE) shall be a fully user-programmable, digital controller that includes a minimum of 33 I/O points. It shall reside on the automation network and shall support a subnet of 32 Field Controllers

C. User Interface - Each NCE shall have the ability to deliver a web based User Interface (UI) as previously described for Network Automation Engines.

D. The NCE shall employ a finite state control engine to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals as well as four (4) hours per controller per warranty year per controller to re-tune loops according to current system conditions. This time shall be equally divided between the change from heating season to cooling season and back to heating season.

E. The NCE shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable.

F. The NCE shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.

G. The NCE shall support the following number and types of inputs and outputs:
   1. Ten Universal Inputs - shall be configured to monitor any of the following:
      a. Analog Input, Voltage Mode
      b. Analog Input, Current Mode
      c. Analog Input, Resistive Mode
      d. Binary Input, Dry Contact Maintained Mode
      e. Binary Input, Pulse Counter Mode
      f. Eight Binary Inputs - shall be configured to monitor either of the following:
      g. Dry Contact Maintained Mode
      h. Pulse Counter Mode
   2. Four Analog Outputs - shall be configured to output either of the following
      a. Analog Output, Voltage Mode
      b. Analog Output, Current Mode
   3. Seven Binary Outputs - shall output the following:
      a. 24 VAC Triac
   4. Four Configurable Outputs - shall be configured to output either of the following:
      a. Analog Output, Voltage Mode
      b. Binary Output, 24 VAC Triac Mode
   5. The NCE shall have the ability to monitor and control a network of sensors and actuators over a Sensor-Actuator Bus (SA Bus). The SA Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.
   6. The NCE shall have the capability to execute complex control sequences involving direct wired I/O points as well as input and output devices communicating over the Field Trunk or the SA Bus.
   7. All Network Control Engines shall be provided with a panel mountable Local Controller Display either as an integral part of the NCE or as a remote device communicating over the SA Bus.
   8. The Display shall use a BACnet Standard SSPC-135, clause 9 Master-Slave/Token-Passing protocol and shall allow the user to view monitored points without logging into the system.
   9. The Display shall provide password protection with User adjustable password time-out. It shall also allow the user to view and change setpoints, modes of operation, and parameters.
   10. The Display shall be menu driven with separate paths for:
      a. Input/Output
      b. Parameter/Setpoint
      c. Overrides

11. The Display shall use easy-to-read English text messages and shall allow the user to select the points to be shown and in what order.
12. The Display shall support a back lit Liquid Crystal Display (LCD) with adjustable contrast and brightens and automatic backlight brightening during user interaction.
13. The display shall be a minimum of 4 lines and a minimum of 20 characters per line
14. The NCE shall be microprocessor-based with a minimum word size of 32 bits. The processor shall be a multi-tasking, multi-user, and real-time digital control processor. Standard operating systems shall be employed. NCE size and capability shall be sufficient to fully meet the requirements of this Specification.
15. Each NCE shall have sufficient memory to support its own operating system, databases, and control programs, and to provide supervisory control for all control level devices.
16. The NCE shall employ nonvolatile Flash memory to store all programs and data. The NCE shall employ a data protection battery to save data and power the real time clock when primary power is interrupted.
17. Communications Ports - The NCE shall provide the following ports for operation of operator Input/Output (I/O) devices, such as industry-standard computers, modems, and portable operator's terminals.
    a. USB port
    b. RS-232 serial data communication port
    c. RS-485 port
    d. RJ-45 Ethernet port
    e. RJ-12 jack
    f. The NCE shall support an optional internal modem with RJ-12 6-pin telephone line connector.
18. Diagnostics - The NCE shall continuously perform self-diagnostics, communication diagnosis, and diagnosis of all panel components. The Network Control Engine shall provide both local and remote annunciation of any detected component failures, low battery conditions, or repeated failures to establish communication.
19. Power Failure - In the event of the loss of normal power, The NCE shall continue to operate for a user adjustable period of up to 10 minutes after which there shall be an orderly shutdown of all programs to prevent the loss of database or operating system software.
20. During a loss of normal power, the control sequences shall go to the normal system shutdown conditions. All critical configuration data shall be saved into Flash memory.
21. Upon restoration of normal power and after a minimum off-time delay, the controller shall automatically resume full operation without manual intervention through a normal soft-start sequence.
22. Field Controller Bus - The NCE shall support the same communication protocols as described for the Network Engines.

2.06 DDC SYSTEM CONTROLLERS

A. Field Equipment Controller (FEC)
1. The Field Equipment Controller (FEC) shall be a fully user-programmable, digital controller that supports and communicates via BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9 on the controller network. It shall be BACnet Testing Labs (BTL) certified as a BACnet Application Specific Controller (B-ASC) and carry the BTL Label.
2. The FEC shall employ a finite state control engine to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals as well as four (4) hours per warranty year per controller to re-tune loops according to current system conditions. This time shall be equally divided between the change from heating season to cooling season and back to heating season
3. Controllers shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable.

4. The FEC shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB. It shall include troubleshooting LED indicators.
5. The FEC shall support the following types of direct wired inputs and outputs:
   a. Universal Inputs - shall be configured to monitor any of the following:
      1) Analog Input, Voltage Mode
      2) Analog Input, Current Mode
      3) Analog Input, Resistive Mode
      4) Binary Input, Dry Contact Maintained Mode
      5) Binary Input, Pulse Counter Mode
   b. Binary Inputs - shall be configured to monitor either of the following:
      1) Dry Contact Maintained Mode
      2) Pulse Counter Mode
   c. Analog Outputs - shall be configured to output either of the following
      1) Analog Output, Voltage Mode
      2) Analog Output, current Mode
   d. Binary Outputs - shall output the following:
      1) 24 VAC Triac
   e. Configurable Outputs - shall be capable of the following:
      1) Analog Output, Voltage Mode
      2) Binary Output Mode
6. The FEC shall have the ability to reside on a Field Controller Bus (FC Bus).
7. The FC Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.
8. The FC Bus shall support communications between the FECs and NAE(s) or NCE(s).
9. The FC Bus shall also support Input/Output Module (IOM) communications with the FEC and with the NAE or NCE.
10. The FEC shall have the ability to monitor and control a network of sensors and actuators over a Sensor-Actuator Bus (SA Bus). The SA Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard Protocol SSPC-135, Clause 9.
11. The FEC shall support, but not be limited to, the following applications:
    a. Optional chilled water/central plant optimization applications
    b. Heating central plant applications
    c. Built-up air handling units for special applications
    d. Terminal & package units
    e. Special programs as required for systems control
12. The FEC shall support the same Local Controller Display previously described for use with the Network Control Engine. All FEC controllers located indoors serving mechanical equipment other than ceiling hung terminal units shall be provided with their own Local Controller Display.

2.07 FIELD DEVICES

A. Input/Output Module (IOM)
   1. The Input/Output Module (IOM) provides additional inputs and outputs for use in the FEC.
   2. The IOM shall communicate with the FEC over the FC Bus or the SA Bus.
   3. The IOM shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9 on the controller network.
      a. The IOM shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.
      b. The IOM shall be tested and certified as a BACnet Application Specific Controller (B-ASC).
      c. A BACnet Protocol Implementation Conformance Statement shall be provided for the FEC.
   4. The IOM shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.

B. Networked Thermostat (TEC)
   1. The networked thermostat shall be capable of controlling two- or four-pipe fan coils, cabinet unit heaters, reheat coil valves or other similar equipment.
   2. The TEC shall communicate over the Field Controller Bus using BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9.
   3. The TEC shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.
      a. The TEC shall be tested and certified as a BACnet Application Specific Controller (B-ASC).
      b. A BACnet Protocol Implementation Conformance Statement shall be provided for the TEC.
   4. The Networked Thermostat shall support remote read/write and parameter adjustment from the web based User Interfaceable through a Network Automation Engine.
   5. The Networked Thermostat shall include an intuitive User Interface providing plain text messages.
      a. Two line, 8 character backlit display
      b. LED indicators for Fan, Heat, and Cool status
      c. Five (5) User Interface Keys
         1) Mode
         2) Fan
         3) Override
         4) Degrees C/F
         5) Up/Down
      d. The display shall continuously scroll through the following parameters:
         1) Room Temperature
         2) System Mode
         3) Schedule Status - Occupied/Unoccupied/Override
         4) Applicable Alarms
   6. The Networked Thermostat shall provide the flexibility to support any one of the following inputs:
      a. Integral Indoor Air Temperature Sensor
      b. Duct Mount Air Temperature Sensor
      c. Remote Indoor Air Temperature Sensor with Occupancy Override and LED Indicator
      d. Two configurable binary inputs
   7. The Networked Thermostat shall provide the flexibility to support any one of the following outputs:
      a. Three Speed Fan Control
      b. Two On/Off
      c. Two Floating
      d. Two Proportional (0 to 10V)
   8. The Networked Thermostat shall provide a minimum of six (6) levels of keypad lockout.
   9. The Networked Thermostat shall provide the flexibility to adjust the following parameters:
   10. Adjustable Temporary Occupancy from 0 to 24 hours
   11. Adjustable heating/cooling deadband from 2º F to 5º F
   12. Adjustable heating/cooling cycles per hour from 4 to 8
   13. Where required by application and indicated on plans or room schedules provide the Networked Thermostat with an integral Passive Infra-Red (PIR) occupancy sensor.
   14. The Networked Thermostat shall employ nonvolatile electrically erasable programmable read-only memory (EEPROM) for all adjustable parameters.

2.08 SYSTEM TOOLS

A. System Configuration Tool (SCT)
   1. The Configuration Tool shall be a software package enabling a computer platform to be used as a stand-alone engineering configuration tool for a Network Automation Engine (NAE).

2. The configuration tool shall provide an archive database for the configuration and application data.
3. The configuration tool shall have the same look-and-feel at the User Interface (UI) regardless of whether the configuration is being done online or offline.
4. The configuration tool shall include the following features:
   a. Basic system navigation tree for connected networks
   b. Integration of Metasys N1, LonWorks, and BACnet enabled devices
   c. Customized user navigation trees
   d. Point naming operating parameter setting
   e. Graphic diagram configuration
   f. Alarm and event message routing
   g. Graphical logic connector tool for custom programming
   h. Downloading, uploading, and archiving databases
5. The configuration tool shall have the capability to automatically discover field devices on connected buses and networks. Automatic discovery shall be available for the following field devices:
   a. BACnet Devices
   b. LonWorks devices
6. The configuration tool shall be capable of programming the Field Equipment Controllers.
   a. The configuration tool shall provide the capability to configure, simulate, and commission the Field Equipment Controllers.
   b. The configuration tool shall allow the FECs to be run in Simulation Mode to verify the applications.
   c. The configuration tool shall contain a library of standard applications to be used for configuration.
7. The configuration tool shall be capable of programming the field devices.
   a. The configuration tool shall provide the capability to configure, simulate, and commission the field devices.
   b. The configuration tool shall allow the field devices to be run in Simulation Mode to verify the applications.
   c. The configuration tool shall contain a library of standard applications to be used for configuration
8. A wireless access point shall allow a wireless enabled portable PC to make a temporary Ethernet connection to the automation network.
   a. The wireless connection shall allow the PC to access configuration tool through the web browser using the User Interface (UI).
   b. The wireless use of configuration tool shall be the same as a wired connection in every respect.
   c. The wireless connection shall use the Bluetooth Wireless Technology.

2.09 INPUT DEVICES

A. General Requirements
   1. Installation, testing, and calibration of all sensors, transmitters, and other input devices shall be provided to meet the system requirements.

B. Temperature Sensors
   1. General Requirements:
      a. Sensors and transmitters shall be provided, as outlined in the input/output summary and sequence of operations.
      b. The temperature sensor shall be of the resistance type, and shall be either two-wire 1000 ohm nickel RTD, or two-wire 1000 ohm platinum RTD.
      c. The following point types (and the accuracy of each) are required, and their associated accuracy values include errors associated with the sensor, lead wire, and A to D conversion:

Point Type	Accuracy
Accuracy	+/- .5°F
Room Temp	+/- .5°F
Duct Temperature	+/- .5°F
All Others	+/- .75°F

1. Room Temperature Sensors
   a. Room sensors shall be constructed for either surface or wall box mounting.
   b. Room sensors shall have the following options:
      1) Setpoint reset slide switch providing a +3 degree (adjustable) range.
      2) A momentary override request push button for activation of after-hours operation.
2. Room Temperature Sensors with Integral Display
   a. Room sensors shall have an integral display when specified in the sequence of operations or elsewhere in these documents.
3. Thermo wells
   a. When thermo wells are required, the sensor and well shall be supplied as a complete assembly, including wellhead and Greenfield fitting.
   b. Thermo wells shall be pressure rated and constructed in accordance with the system working pressure.
   c. Thermo wells and sensors shall be mounted in a threadolet or 1/2” NFT saddle and allow easy access to the sensor for repair or replacement.
   d. Thermo wells shall be constructed of 316 stainless steel.
4. Outside Air Sensors
   a. Outside air sensors shall be designed to withstand the environmental conditions to which they will be exposed. They shall also be provided with a solar shield.
   b. Sensors exposed to wind velocity pressures shall be shielded by a perforated plate that surrounds the sensor element.
   c. Temperature transmitters shall be of NEMA 3R construction and rated for ambient temperatures.
5. Duct Mount Sensors
   a. Duct mount sensors shall mount in an electrical box through a hole in the duct, and be positioned so as to be easily accessible for repair or replacement.
   b. Duct sensors shall be insertion type and constructed as a complete assembly, including lock nut and mounting plate.
   c. For outdoor air duct applications, a weatherproof mounting box with weatherproof cover and gasket shall be used.
6. Averaging Sensors
   a. For ductwork greater in any dimension that 48 inches and/or where air temperature stratification exists, an averaging sensor with multiple sensing points shall be used.
   b. For plenum applications, such as mixed air temperature measurements, a string of sensors mounted across the plenum shall be used to account for stratification and/or air turbulence. The averaging string shall have a minimum of 4 sensing points per 12-foot long segment.
   c. Capillary supports at the sides of the duct shall be provided to support the sensing string.

C. Humidity Sensors
1. The sensor shall be a solid-state type, relative humidity sensor of the Bulk Polymer Design. The sensor element shall resist service contamination.
2. The humidity transmitter shall be equipped with non-interactive span and zero adjustments, a 2-wire isolated loop powered, 4-20 mA, 0-100% linear proportional output.
3. The humidity transmitter shall meet the following overall accuracy, including lead loss and Analog to Digital conversion. 3% between 20% and 80% RH @ 77 Deg F unless specified elsewhere.

4. Outside air relative humidity sensors shall be installed with a rain proof, perforated cover. The transmitter shall be installed in a NEMA 3R enclosure with sealtite fittings and stainless steel bushings.
5. A single point humidity calibrator shall be provided, if required, for field calibration. Transmitters shall be shipped factory pre-calibrated.
6. Duct type sensing probes shall be constructed of 304 stainless steel, and shall be equipped with a neoprene grommet, bushings, and a mounting bracket.

D. Differential Pressure Transmitters
1. General Air and Water Pressure Transmitter Requirements:
   a. Pressure transmitters shall be constructed to withstand 100% pressure over-range without damage, and to hold calibrated accuracy when subject to a momentary 40% over-range input.
   b. Pressure transmitters shall transmit a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA output signal.
   c. Differential pressure transmitters used for flow measurement shall be sized to the flow sensing device, and shall be supplied with Tee fittings and shut-off valves in the high and low sensing pick-up lines to allow the balancing Contractor and Owner permanent, easy-to-use connection.
   d. A minimum of a NEMA 1 housing shall be provided for the transmitter. Transmitters shall be located in accessible local control panels wherever possible.
2. Building Differential Air Pressure Applications (-1” to +1” w.c.)
   a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.
   b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
      1) -1.00 to +1.00 w.c. input differential pressure ranges. (Select range appropriate for system application)
      2) 4-20 mA output.
      3) Maintain accuracy up to 20 to 1 ratio turndown.
      4) Reference Accuracy: +0.2% of full span.
3. Low Differential Air Pressure Applications (0” to 5” w.c.)
   a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.
   b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
      1) (0.00 - 1.00” to 5.00”) w.c. input differential pressure ranges. (Select range appropriate for system application.)
      2) 4-20 mA output.
      3) Maintain accuracy up to 20 to 1 ratio turndown.
      4) Reference Accuracy: +0.2% of full span.

E. Status and Safety Switches
1. General Requirements
   a. Switches shall be provided to monitor equipment status, safety conditions, and generate alarms at the BMS when a failure or abnormal condition occurs. Safety switches shall be provided with two sets of contacts and shall be interlock wired to shut down respective equipment.
2. Current Sensing Switches
   a. The current sensing switch shall be self-powered with solid-state circuitry and a dry contact output. It shall consist of a current transformer, a solid state current sensing circuit, adjustable trip point, solid state switch, SPDT relay, and an LED indicating the

on or off status. A conductor of the load shall be passed through the window of the device. It shall accept over-current up to twice its trip point range.

b. Current sensing switches shall be used for run status for fans, pumps, and other miscellaneous motor loads.

c. Current sensing switches shall be calibrated to show a positive run status only when the motor is operating under load. A motor running with a broken belt or coupling shall indicate a negative run status.

3. Air Filter Status Switches
   a. Differential pressure switches used to monitor air filter status shall be of the automatic reset type with SPDT contacts rated for 2 amps at 120VAC.
   b. A complete installation kit shall be provided, including: static pressure tops, tubing, fittings, and air filters.
   c. Provide appropriate scale range and differential adjustment for intended service.
4. Air Flow Switches
   a. Differential pressure flow switches shall be bellows actuated mercury switches or snap acting micro-switches with appropriate scale range and differential adjustment for intended service.
5. Air Pressure Safety Switches
   a. Air pressure safety switches shall be of the manual reset type with SPDT contacts rated for 2 amps at 120VAC.
   b. Pressure range shall be adjustable with appropriate scale range and differential adjustment for intended service.
6. Low Temperature Limit Switches
   a. The low temperature limit switch shall be of the manual reset type with Double Pole/Single Throw snap acting contacts rated for 16 amps at 120VAC.
   b. The sensing element shall be a minimum of 15 feet in length and shall react to the coldest 18-inch section. Element shall be mounted horizontally across duct in accordance with manufacturers recommended installation procedures.
   c. For large duct areas where the sensing element does not provide full coverage of the air stream, additional switches shall be provided as required to provide full protection of the air stream.
   d. The low temperature limit switch shall be equal to Johnson Controls A70.

2.10 OUTPUT DEVICES

A. Actuators
   1. General Requirements
      a. Damper and valve actuators shall be electronic and/or pneumatic, as specified in the System Description section.
   2. Electronic Damper Actuators
      a. Electronic damper actuators shall be direct shaft mount.
      b. Modulating and two-position actuators shall be provided as required by the sequence of operations. Damper sections shall be sized Based on actuator manufacturer’s recommendations for face velocity, differential pressure and damper type. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the dampers, as required. All actuators (except terminal units) shall be furnished with mechanical spring return unless otherwise specified in the sequences of operations. All actuators shall have external adjustable stops to limit the travel in either direction, and a gear release to allow manual positioning.
      c. Modulating actuators shall accept 24 VAC or VDC power supply, consume no more than 15 VA, and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA, and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal and may be used to parallel other actuators and provide true position indication. The feedback signal of one damper actuator for each separately controlled damper shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.

d. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Isolation, smoke, exhaust fan, and other dampers, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop associated fan. Two-position actuators, as specified in sequences of operations as “quick acting,” shall move full stroke within 20 seconds. All smoke damper actuators shall be quick acting.

3. Electronic Valve Actuators
   a. Electronic valve actuators shall be manufactured by the valve manufacturer.
   b. Each actuator shall have current limiting circuitry incorporated in its design to prevent damage to the actuator.
   c. Modulating and two-position actuators shall be provided as required by the sequence of operations. Actuators shall provide the minimum torque required for proper valve close-off against the system pressure for the required application. The valve actuator shall be sized Based on valve manufacturer’s recommendations for flow and pressure differential. All actuators shall fail in the last position unless specified with mechanical spring return in the sequence of operations. The spring return feature shall permit normally open or normally closed positions of the valves, as required. All direct shaft mount rotational actuators shall have external adjustable stops to limit the travel in either direction.
   d. Modulating Actuators shall accept 24 VAC or VDC and 120 VAC power supply and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal, and may be used to parallel other actuators and provide true position indication. The feedback signal of each valve actuator (except terminal valves) shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
   e. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Butterfly isolation and other valves, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop the associated pump or chiller.

B. Control Valves
   1. All automatic control valves shall be fully proportioning and provide near linear heat transfer control. The valves shall be quiet in operation and fail-safe open, closed, or in their last position. All valves shall operate in sequence with another valve when required by the sequence of operations. All control valves shall be sized by the control manufacturer, and shall be guaranteed to meet the heating and cooling loads, as specified. All control valves shall be suitable for the system flow conditions and close against the differential pressures involved. Body pressure rating and connection type (sweat, screwed, or flanged) shall conform to the pipe schedule elsewhere in this Specification.
   2. Chilled water control valves shall be modulating plug, ball, and/or butterfly, as required by the specific application. Modulating water valves shall be sized per manufacturer’s recommendations for the given application. In general, valves (2 or 3-way) serving variable flow air handling unit coils shall be sized for a pressure drop equal to the actual coil pressure drop, but no less than 5 PSI. Valves (3-way) serving constant flow air handling unit coils with secondary circuit pumps shall be sized for a pressure drop equal to 25% the actual coil pressure drop, but no less than 2 PSI. Mixing valves (3-way) serving secondary water circuits shall be sized for a pressure drop of no less than 5 PSI. Valves for terminal reheat coils shall be sized for a 2 PSIG pressure drop, but no more than a 5 PSI drop.
   3. Ball valves shall be used for hot and chilled water applications, water terminal reheat coils, radiant panels, unit heaters, package air conditioning units, and fan coil units except those described hereinafter.
   4. Modulating plug water valves of the single-seat type with equal percentage flow characteristics shall be used for all special applications as indicated on the valve schedule. Valve discs shall be composition type. Valve stems shall be stainless steel.

5. Butterfly valves shall be acceptable for modulating large flow applications greater than modulating plug valves, and for all two-position, open/close applications. In-line and/or three-way butterfly valves shall be heavy-duty pattern with a body rating comparable to the pipe rating, replaceable lining suitable for temperature of system, and a stainless steel vane. Valves for modulating service shall be sized and travel limited to 50 degrees of full open. Valves for isolation service shall be the same as the pipe. Valves in the closed position shall be bubble-tight.

C. Electronic Signal Isolation Transducers
1. A signal isolation transducer shall be provided whenever an analog output signal from the BMS is to be connected to an external control system as an input (such as a chiller control panel), or is to receive as an input signal from a remote system.
2. The signal isolation transducer shall provide ground plane isolation between systems.
3. Signals shall provide optical isolation between systems.

2.11 MISCELLANEOUS DEVICES

A. Local Control Panels
1. All control panels shall be factory constructed, incorporating the BMS manufacturer's standard designs and layouts. All control panels shall be UL inspected and listed as an assembly and carry a UL 508 label listing compliance. Control panels shall be fully enclosed, with perforated sub-panel, hinged door, and slotted flush latch.
2. In general, the control panels shall consist of the DDC controller(s), display module as specified and indicated on the plans, and I/O devices-such as relays, transducers, and so forth-that are not required to be located external to the control panel due to function. Where specified the display module shall be flush mounted in the panel face unless otherwise noted.
3. All I/O connections on the DDC controller shall be provide via removable or fixed screw terminals.
4. Low and line voltage wiring shall be segregated. All provided terminal strips and wiring shall be UL listed, 300-volt service and provide adequate clearance for field wiring.
5. All wiring shall be neatly installed in plastic trays or tie-wrapped.
6. A 120 volt convenience outlet, fused on/off power switch, and required transformers shall be provided in each enclosure.

PART 3 - PERFORMANCE/EXECUTION

3.01 BMS SPECIFIC REQUIREMENTS

A. Graphic Displays
1. Provide a color graphic system flow diagram display for each system with all points as indicated on the point list. All terminal unit graphic displays shall be from a standard design library.
2. User shall access the various system schematics via a graphical penetration scheme and/or menu selection. .

B. Remote Access:
1. The Owner shall be provided the ability to use a smart device such as a tablet PC or smart phone, to remotely monitor and control the BMS system. Provide unique login passwords to limit the remote user to the AC unit associated with his/her space within the building.

3.02 INSTALLATION PRACTICES

A. BMS Wiring
1. All conduit, wiring, accessories and wiring connections required for the installation of the Building Management System, as herein specified, shall be provided by the BMS Contractor unless specifically shown on the Electrical Drawings under Division 16 Electrical. All wiring shall comply with the requirements of applicable portions of Division 16 and all local and national electric codes, unless specified otherwise in this section.
2. All BMS wiring materials and installation methods shall comply with BMS manufacturer recommendations.

3. The sizing, type and provision of cable, conduit, cable trays, and raceways shall be the design responsibility of the BMS Contractor. If complications arise, however, due to the incorrect selection of cable, cable trays, raceways and/or conduit by the BMS Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.
4. Class 2 Wiring
    a. All Class 2 (24VAC or less) wiring shall be installed in conduit unless otherwise specified.
    b. Conduit is not required for Class 2 wiring in concealed accessible locations. Class 2 wiring not installed in conduit shall be supported every 5’ from the building structure utilizing metal hangers designed for this application. Wiring shall be installed parallel to the building structural lines. All wiring shall be installed in accordance with local code requirements.
5. Class 2 signal wiring and 24VAC power can be run in the same conduit. Power wiring 120VAC and greater cannot share the same conduit with Class 2 signal wiring.
6. Provide for complete grounding of all applicable signal and communications cables, panels and equipment so as to ensure system integrity of operation. Ground cabling and conduit at the panel terminations. Avoid grounding loops.

B. BMS Line Voltage Power Source
1. 120-volt AC circuits used for the Building Management System shall be taken from panel boards and circuit breakers provided by Division 16.
2. Circuits used for the BMS shall be dedicated to the BMS and shall not be used for any other purposes.
3. DDC terminal unit controllers may use AC power from motor power circuits.

C. BMS Raceway
1. All wiring shall be installed in conduit or raceway except as noted elsewhere in this specification. Minimum control wiring conduit size 3/4”.
2. Where it is not possible to conceal raceways in finished locations, surface raceway (Wiremold) may be used as approved by the Architect.
3. All conduits and raceways shall be installed level, plumb, at right angles to the building lines and shall follow the contours of the surface to which they are attached.
4. Flexible Metal Conduit shall be used for vibration isolation and shall be limited to 3 feet in length when terminating to vibrating equipment. Flexible Metal Conduit may be used within partition walls. Flexible Metal Conduit shall be UL listed.

D. Penetrations
1. Provide fire stopping for all penetrations used by dedicated BMS conduits and raceways.
2. All openings in fire proofed or fire stopped components shall be closed by using approved fire resistive sealant.
3. All wiring passing through penetrations, including walls shall be in conduit or enclosed raceway.
4. Penetrations of floor slabs shall be by core drilling. All penetrations shall be plumb, true, and square.

E. BMS Identification Standards
1. Node Identification. All nodes shall be identified by a permanent label fastened to the enclosure. Labels shall be suitable for the node location.
    a. Cable types specified in Item A shall be color coded for easy identification and troubleshooting.

F. BMS Panel Installation
1. The BMS panels and cabinets shall be located as indicated at an elevation of not less than 2 feet from the bottom edge of the panel to the finished floor. Each cabinet shall be anchored per the manufacturer’s recommendations.
2. The BMS contractor shall be responsible for coordinating panel locations with other trades and electrical and mechanical contractors.

G. Input Devices
   1. All Input devices shall be installed per the manufacturer recommendation
   2. Locate components of the BMS in accessible local control panels wherever possible.

H. HVAC Input Devices - General
   1. All Input devices shall be installed per the manufacturer recommendation
   2. Locate components of the BMS in accessible local control panels wherever possible.
   3. The mechanical contractor shall install all in-line devices such as temperature wells, pressure taps, airflow stations, etc.
   4. Outside Air Sensors
      a. Sensors shall be mounted on the North wall to minimize solar radiant heat impact or located in a continuous intake flow adequate to monitor outside air conditions accurately.
      b. Sensors shall be installed with a rain proof, perforated cover.
   5. Building Differential Air Pressure Applications (-1” to +1” w.c.):
      a. Transmitters exterior sensing tip shall be installed with a shielded static air probe to reduce pressure fluctuations caused by wind.
      b. The interior tip shall be inconspicuous and located as shown on the drawings.
   6. Duct Temperature Sensors:
      a. Duct mount sensors shall mount in an electrical box through a hole in the duct and be positioned so as to be easily accessible for repair or replacement.
      b. The sensors shall be insertion type and constructed as a complete assembly including lock nut and mounting plate.
      c. For ductwork greater in any dimension than 48 inches or where air temperature stratification exists such as a mixed air plenum, utilize an averaging sensor.
      d. The sensor shall be mounted to suitable supports using factory approved element holders.
   7. Space Sensors:
      a. Shall be mounted per ADA requirements.
      b. Provide lockable tamper-proof covers in public areas and/or where indicated on the plans.
   8. Low Temperature Limit Switches:
      a. Install on the discharge side of the first water or steam coil in the air stream.
      b. Mount element horizontally across duct in a serpentine pattern insuring each square foot of coil is protected by 1 foot of sensor.
      c. For large duct areas where the sensing element does not provide full coverage of the air stream, provide additional switches as required to provide full protection of the air stream.
   9. Air Differential Pressure Status Switches:
      a. Install with static pressure tips, tubing, fittings, and air filter.
   10. Water Differential Pressure Status Switches:
      a. Install with shut off valves for isolation.

I. HVAC Output Devices
   1. All output devices shall be installed per the manufacturers recommendation. The mechanical contractor shall install all in-line devices such as control valves, dampers, airflow stations, pressure wells, etc.
   2. Actuators: All control actuators shall be sized capable of closing against the maximum system shut-off pressure. The actuator shall modulate in a smooth fashion through the entire stroke.
   3. Control Dampers: Shall be opposed blade for modulating control of airflow. Parallel blade dampers shall be installed for two position applications.
   4. Control Valves: Shall be sized for proper flow control with equal percentage valve plugs. The maximum pressure drop for water applications shall be 5 PSI. The maximum pressure drop for steam applications shall be 7 PSI.

3.03 TRAINING

A. The BMS contractor shall provide the following training services:
   1. Four (4) hours of on-site orientation by a system technician who is fully knowledgeable of the specific installation details of the project. This orientation shall, at a minimum, consist of a review of the project as-built drawings, the BMS software layout and naming conventions, and a walk through of the facility to identify panel and device locations.

3.04 COMMISSIONING

A. Fully commission all aspects of the Building Management System work.

B. Acceptance Check Sheet
   1. Prepare a check sheet that includes all points for all functions of the BMS as indicated on the point list included in this specification.
   2. Submit the check sheet to the Engineer for approval
   3. The Engineer will use the check sheet as the basis for acceptance with the BMS Contractor.

C. Promptly rectify all listed deficiencies and submit to the Engineer that this has been done.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The work specified as part of this Section consists of the integration of equipment controls supplied as part of manufactured items, materials and equipment required by the Drawings and under Divisions 23 and 26 to achieve operational and coordinated Sequences of Operation as Specified. Work shall include management of the system start up and operational check out, coordination of functions of controllers supplied as part of equipment packages, sizing of control valves and damper operators for dampers, interconnection of systems, provision and installation of all accessory devices required for complete system operation including dampers, control valves and actuators not provided as part of equipment, coordination of start up and testing and demonstration of the operation of Sequences of Operation to the Owner and his representatives.

1.02 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of these Specifications and shall be used in conjunction with this Section as a part of the Contract Documents. Consult them for further instructions pertaining to this work. The Contractor is bound by the provisions of Division 00 and Division 01.

B. The following Sections constitute related work:
   1. Section 230010 - General Mechanical Requirements
   2. Equipment and Systems specified under Division 23
   3. Division 26

1.03 QUALITY ASSURANCE

A. System Installer Qualifications
   1. The Integrator shall have a minimum of five years experience in the integration of systems of a similar nature to those of this Project.
   2. The Integrator shall have an office within 50 miles of the project site and provide 24-hour response in the event of a customer call.

B. Codes and Standards: Meet requirements of all applicable standards and codes, except when more detailed or stringent requirements are indicated by the Contract Documents, including requirements of this Section.
   1. Underwriters Laboratories: Products shall be UL-916-PAZX listed.
   2. National Electrical Code - NFPA 70.

C. All products used in this installation shall be new, currently under manufacture, and shall have been applied in similar installations for a minimum of 2 years. This installation shall not be used as a test site for any new products unless explicitly approved by the Owner's representative in writing prior to bid date. Spare parts shall be available for at least 5 years after completion of this Contract.

1.04 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Control Product Data Submittal
      a. Work plan and schedule: for the start up and check out of all systems including time requirements and resources required from all Sub-Contractors involved.
      b. Complete list of equipment: to be used indicating quantity, manufacturer and model number.
      c. Schedule of all control valves: including the valve size, model number (including pattern and connections), flow, CV, pressure rating, and location.
      d. Schedule of all control dampers: This shall include the damper size, pressure drop, manufacturer and model number.
      e. Provide manufacturers cut sheets for major system components. When manufacturer's cut sheets apply to a product series rather than a specific product, the data specifically

applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawings shall clearly reference the specification and/or drawing that the submittal is being submitted to cover.

f. The submittals required under this Section shall be considered as For Information Only. Review by the Architect/Engineer shall not relieve the Contractor from the responsibility of providing fully operational systems.

g. System Installer Qualifications: Submit qualification statement per the requirements outlined above.

2. Shop Drawings

a. Sequence of operation: Submit a written sequence of operation for each system indicating which functions are to be controlled by controls provided as part of manufactured equipment and which functions will be under control of devices provided as part of this Section.

b. Contractor shall provide shop drawings and manufacturer's standard specification data sheets on all materials and hardware to be provided. No work may begin on any segment of this project until the Architect/Engineer and Owner have reviewed submittals for conformity with the Drawings and Specifications. All shop drawings shall be provided to the Owner electronically as .dwg or .dxf file formats.

c. Interconnecting wiring diagrams: Submit interconnecting wiring diagrams for all systems. These diagrams may rely on diagrams for controls of manufactured equipment provided that the interface points are clearly identified and copies of the manufactured item's control diagrams are submitted for information as part of the submittal package.

1.05 WARRANTY

A. Control system: Warrant all work as follows:

1. Labor & materials for control system specified shall be warranted free from defects for a period of twelve (12) months after final completion acceptance by the Owner. Control System failures during the warranty period shall be adjusted, repaired, or replaced at no charge or reduction in service to the Owner. The Contractor shall respond to the Owner's request for warranty service within 24 hours during customary business hours.

2. At the end of the final start-up/testing, if equipment and systems are operating in a manner satisfactory to the Owner and Architect/Engineer, the Owner shall sign certificates certifying that the control system's operation has been tested and accepted in accordance with the terms of this Specification. The date of Owner's acceptance shall be the start of warranty.

PART 2 - PRODUCTS

2.01 STANDARD OF QUALITY AND PERFORMANCE

A. Products specified are not intended to form a complete scope of supply. They are intended to set a level of quality for items that the Contractor may need to supply to implement a complete Sequence of Operation. Products of a comparable quality and performance may be submitted for approval by the Architect/Engineer.

2.02 MOTORIZED DAMPERS

A. Dampers shall be modulating double-acting opposed blade or parallel blade dampers as required, designed and tested in accordance with AMCA 500, and meeting current energy code. Obtain and verify the location, size and pressure rating of each damper prior to fabrication and delivery. Verify the layout of equipment and ductwork before dampers are fabricated. Pressure drop shall not exceed 0.03 inches water gauge static pressure at 1000 fpm in the fully-open position, and shall be rated for at least 2000 fpm average velocity. Damper shut-off pressure rating shall exceed the fan maximum total head-pressure.

B. Dampers shall be constructed of extruded aluminum or at least No. 16 gauge galvanized steel, with each blade being not more than 8 inches; wide damper frame channel shall be at least 5 inches deep. Each blade end shall have a 3/8 inch stainless steel or plated steel shaft rotating in self-lubricating bearings mounted in a damper channel frame. Blades mounted vertically shall be supported by thrust bearings. Control shaft shall be at least ½ inch diameter.

C. Flat-steel damper blades shall be made rigid by folding the edges. Blades shall have interlocking edges and shall be provided with EPDM or neoprene compressible seals at point of contact. Foam seals are not acceptable. Provide compression-type stainless steel jamb seals continuously along blade edges.

D. Each damper shall be assembled in the manufacturer's shop as a complete unit. Dampers, when closed, shall be guaranteed by the manufacturer not to leak in excess of 20 cfm per square foot at 4 inches w.g. static pressure. Provide dampers with operators having sufficient power to limit leakage to the rate specified.

E. Damper seals shall be suitable for an operating range of minus 20 degrees F (or 20 degrees F below the heating outside design temperature, whichever is lower) at the lower end to 200 degrees F at the upper end.

F. A complete damper assembly shall have blades no longer than 48 inches and no higher than 48 inches. Where greater length or height is required, the assembly shall be made of a combination of sections. Dampers shall be sized for the required air velocity and pressure classification.

G. Approved Manufacturers: Greenheck (VDC-23), Arrow or approved equal.

2.03 ELECTRONIC DAMPER/VALVE ACTUATORS

A. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator.

B. For power-failure/safety applications, an internal mechanical, spring return mechanism shall be built into the actuator housing.
   1. Damper actuators shall fail normally open or closed as described on the Drawings or as follows:
      a. Outdoor Air Intake - normally closed.
      b. Air Exhaust - normally closed.
      c. Other applications - as as required by the Sequence of Operation.

C. All rotary spring return actuators shall be capable of both clockwise and counter clockwise spring return operation.

D. Proportional actuators shall accept a 0-10 VDC or 0-20 ma control signal and provide a 2-10 VDC or 4-20 ma operating range.

E. All 24 VAC/DC actuators shall operate on Class 2 wiring and shall not require more than 10 VA for AC or more than 8 W for DC applications. Actuators operating on 120 VAC or 230 VAC shall not required more than 11 VA.

F. All non-spring return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring return actuators with more than 60 in-lb. torque capacity shall have a manual crank for this purpose.

G. Actuators shall be provided with a conduit fitting and a minimum 1 meter electrical cable and shall be pre-wired to eliminate the necessity of opening the actuator housing to make electrical connections.

H. All modulating actuators shall have an external, built-in switch to allow the reversing of direction of rotation

I. Actuators shall be Underwriters Laboratories Standard 60730-1 listed.

J. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque.

K. Provide a single damper actuator when dampers are less than 4 feet in width. Otherwise provide two damper actuators (one on each side of the ductwork).

2.04 CONTROL VALVES

A. Control valves shall be two-way or three-way type for two-position or modulating service as required.

B. Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum close-off pressure ratings:
   1. Water Valves:
      a. Two-way: 150% of total system (pump) head.
      b. Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.
   2. Steam Valves: 150% of operating (inlet) pressure.

C. Valve Failure Position:
   1. Valves shall fail normally open or closed as indicated on the Drawings or as follows:
      a. Heating coils in air handlers - normally open.
      b. Chilled water control valves - normally closed
      c. Other applications - as scheduled or as required by Sequence of Operation.
   2. Zone valves shall be sized to meet the control application and they shall maintain their last position in the event of a power failure.

D. Water Valves:
   1. Body and trim materials shall be as specified in “Pipe, Valve & Fittings” specification. Equal percentage ports for modulating service.
   2. Sizing Criteria:
      a. Three-way Modulating Service: Pressure drop equal to twice the pressure drop through the coil exchanger (load), [5] psi maximum.
      b. Contractor shall verify sizing criteria with manufacturer.

E. Steam Valves:
   1. Body and trim materials shall be as specified in “Pipe, Valve & Fittings” specification. Linear ports for modulating service.
   2. Sizing Criteria:
      a. Two-position service: pressure drop 10% to 20% of inlet pressure (psig).
      b. Modulating service 15 psig or less: pressure drop 80% of inlet pressure (psig).
      c. Modulating service 16 psig to 50 psig: pressure drop as scheduled on plans.
      d. In all cases above the contractor shall verify sizing criteria with the valve manufacturer.

2.05 TEMPERATURE SENSORS

A. Temperature sensors shall be Resistance Temperature Device (RTD) or Thermistor.

B. Duct sensors shall be rigid or averaging as required. Averaging sensors shall be a minimum of 5 feet in length.

C. Immersion sensors shall be provided with a separable stainless steel well. Pressure rating of well is to be consistent with the system pressure in which it is to be installed.

D. Space sensors shall be equipped with set-point adjustment, override switch, display, and communication port.

E. Provide matched temperature sensors for differential temperature measurement. Differential accuracy shall be within 0.2 degrees F.

F. The space temperature, setpoint, and override confirmation shall be annunciated by a digital display for each zone sensor. The setpoint shall be selectable utilizing buttons.

2.06 HUMIDITY SENSORS

A. Room Humidity sensors shall have an accuracy of ±1% from 10% to 80% RH with One-point adjustment calibration. The operating temperature range shall be -10° to 150°F max.

B. Duct sensors shall have a sensing range of 20% to 80% with accuracy of ±1% R.H. Duct sensors shall be provided with a sampling chamber.

C. Outdoor air humidity sensors shall have a sensing range of 20% to 95% R.H. and shall be suitable for ambient conditions of -40 degrees F to 170 degrees F.

D. Humidity sensor's drift shall not exceed 1% of full scale per year.

2.07 STATIC PRESSURE SENSORS

A. Sensor shall have linear output signal. Zero and span shall be field-adjustable.

B. Sensor sensing elements shall withstand continuous operating conditions plus or minus 50% greater than calibrated span without damage.

C. Water pressure sensor shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Sensor shall be complete with 4-20 ma output, required mounting brackets, and block and bleed valves. Mount in location accessible for service.

D. Water differential pressure sensor shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Over-range limit (DP) and maximum static pressure shall be 3,000 psi. Transmitter shall be complete with 4-20 ma output, required mounting brackets, and five-valve manifold. Mount in a location accessible for service.

2.08 LOW LIMIT THERMOSTATS

A. Safety low limit thermostats shall be vapor pressure type with an element 20 ft minimum length. Element shall respond to the lowest temperature sensed by any one foot section.

2.09 FLOW SWITCHES

A. Flow-proving switches shall be either paddle or differential pressure type, as shown on the Drawings or as specified.

B. Paddle type switches (water service only) shall be UL listed, SPDT snap-acting with pilot duty rating (125 VA minimum). Adjustable sensitivity with NEMA 1 Type enclosure unless otherwise specified:

C. Differential pressure type switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum), NEMA 1 Type enclosure, with scale range and differential suitable for intended application, or as specified.

D. Current sensing relays may be used for flow sensing or terminal devices.

2.10 RELAYS

A. Control relays shall be UL listed plug-in type with dust cover. Contact rating, configuration, and coil voltage suitable for application.

B. Time delay relays shall be UL listed solid-state plug-in type with adjustable time delay. Delay shall be adjustable plus or minus 200% (minimum) from set-point shown on plans. Contact rating, configuration, and coil voltage suitable for application. Provide NEMA 1 Type enclosure when not installed in local control panel.

2.11 TRANSFORMERS AND POWER SUPPLIES

A. Control transformers shall be UL listed, Class 2 current-limiting type, or shall be furnished with over-current protection in both primary and secondary circuits for Class 2 service.

B. Unit output shall match the required output current and voltage requirements. Current output shall allow for a 50% safety factor. Output ripple shall be 3.0 mV maximum Peak-to-Peak. Regulation shall be 0.10% line and load combined, with 50 microsecond response time for 50% load changes. Unit shall have built-in over-voltage protection.

C. Unit shall operate between 0 degrees C and 50 degrees C.

D. Unit shall be UL recognized.

2.12 CURRENT SWITCHES

A. Current-operated switches shall be self-powered, solid state with adjustable trip current. The switches shall be selected to match the current of the application and output requirements of the control system.

2.13 LOCAL CONTROL PANELS

A. All indoor control cabinets shall be fully enclosed NEMA 1 or NEMA 4 rating as required. Provide cabinet with hinged door, key-lock latch, and removable sub-panels. A single key shall be common to all field panels and sub-panels.

B. Interconnections between internal and face-mounted devices pre-wired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL listed for 600-volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings.

C. Provide on/off power switch with over-current protection and main air gauge for control power sources to each local panel.

2.14 AIR FLOW MEASURING STATIONS

A. Air flow measuring stations shall be multi-point, multi-axis flow ring or cross sensor. Single point or flow bar sensors are not acceptable. The airflow measurement station shall measure from 15 percent to 100 percent of unit nominal airflow. The air flow measuring station shall adjust for temperature variations and shall provide a 2 to 10 Vdc signal that corresponds to actual airflow for controlling and documenting airflow. The accuracy of the airflow measurement station shall be +- 5 percent.

B. Air flow measuring stations shall be provided by the air handler manufacturer or the VAV box manufacturer. See air handler or VAV box specification section for more details.

2.15 WALL MOUNTED CARBON DIOXIDE SENSORS

A. Carbon dioxide sensors shall be of the wall mounted type.

B. Sensors shall be of the auto-calibrated type designed to operate from 24VAC or 24VDC power.

C. Range: 0-2000 ppm CO2

D. Accuracy: ±30 ppm CO2 + 3% of reading

E. Annual Zero Drift: ±10 ppm

F. Response Time: < 3 minutes

G. Output Signals:
   1. 0-10 VDC
   2. 4-10 mA or 2-10 VDC

H. Resolution of Analog Outputs: 2 ppm CO2

I. Housing Material: Polycarbonate/ABS blend

J. The space temperature, setpoint, and override confirmation shall be annunciated by a digital display for each zone sensor. The setpoint shall be selectable utilizing buttons.

PART 3 - EXECUTION

3.01 GENERAL WORKMANSHIP

A. Install equipment, piping, wiring/conduit parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible.

B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.

C. Install all equipment in readily accessible location as defined by Chapter 1 Article 100 part A of the NEC. Control panels shall be attached to structural walls unless mounted in equipment enclosure specifically designed for that purpose. Panels shall be mounted to allow for unobstructed access for service.

D. Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.

E. All equipment, installation, and wiring shall comply with acceptable industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

3.02 WIRING

A. All control and interlock wiring shall comply with the national and local electrical codes and Division 26 of these Specifications. Where the requirements of this Section differ with those in Division 26, the requirements of this Section shall take precedence.

B. Do not install Class 2 wiring in conduit containing Class 1 wiring. Do not use boxes and panels containing high voltage for low voltage wiring except for the purpose of interfacing the two (e.g. relays and transformers).

C. Control wiring located in a plenum space that is not installed in a conduit shall be plenum rated.

D. All wire-to-device connections shall be made at a terminal block or terminal strip. All wire-to wire connections shall be at a terminal blocks, or with a crimped connector. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.

E. Maximum allowable voltage for control wiring shall be 120V. Provide and install step down transformers.

F. All wiring shall be installed as continuous lengths, where possible. Any required splices shall be made only within an approved junction box or other approved protective device.

G. Maintain fire rating at all penetrations in accordance with other Sections of this Specification and local codes.

H. Size of conduit and size and type of wire shall be the design responsibility of the Contractor, in keeping with the manufacturer's recommendations and the NEC.

I. Locate control and status relays in designated enclosures only. These relays may also be located within packaged equipment control panel enclosures. These relays shall not be located within Class 1 starter enclosures.

J. Follow manufacturer's installation recommendations for all communication and network cabling. Network or communication cabling shall be run separately from other wiring.

K. Adhere to Division 26 requirements for installation of raceway.

L. Maintain an updated (as-built) wiring diagram with terminations identified at the job site.

M. Flexible metal conduits and liquid-tight, flexible metal conduits shall not exceed 3feet in length and shall be supported at each end. Flexible metal conduit less than 1/2" electrical trade size shall not be used. In areas exposed to moisture liquid tight, flexible metal conduits shall be used.

3.03 INSTALLATION OF SENSORS

A. Install sensors in accordance with the manufacturer's recommendations.

B. Mount sensors rigidly and adequate for the environment within which the sensor operates.

C. Room temperature sensors shall be installed on concealed junction boxes properly supported by the wall framing.

D. All wires attached to sensors shall be air sealed in their conduits or in the wall to stop air transmitted from other areas affecting sensor readings.

E. Install duct static pressure tap with tube end facing directly down-stream of air flow.

F. Sensors used in mixing plenums, and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip.

G. All pipe mounted temperature sensors shall be installed in wells. Install all liquid temperature sensors with heat conducting fluid in thermal wells.

H. Wiring for space sensors shall be concealed in building walls. EMT conduit is acceptable within mechanical and service rooms.

I. Install outdoor air temperature sensors on north wall complete with sun shield at designated location.

3.04 FLOW SWITCH INSTALLATION

A. Install using a thread-o-let in steel pipe. In copper pipe use C x C x F Tee, no pipe extensions or substitutions allowed.

B. Mount a minimum of 5 pipe diameters upstream and 5 pipe diameters downstream or 2 feet which ever is greater, from fittings and other obstructions.

C. Install in accordance with manufacturers' instructions.

D. Assure correct flow direction and alignment.

E. Mount in horizontal piping - flow switch on top of the pipe.

3.05 ACTUATOR INSTALLATION

A. Mount and link control damper actuators per manufacturer's instructions.

B. To compress seals when spring return actuators are used on normally closed dampers, power actuator to approximately 5 degrees open position, manually close the damper, and then tighten the linkage.

C. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.

D. Valves - Actuators shall be mounted on valves with adapters approved by the actuator manufacturer. Actuators and adapters shall be mounted following manufacturer's recommendations.

3.06 WARNING LABELS

A. Affix plastic labels on each starter and equipment automatically controlled. Label shall indicate the following:

C A U T I O N

This equipment is operating under automatic control and may start at any time without warning.

3.07 IDENTIFICATION OF HARDWARE AND WIRING

A. All wiring and cabling, including that within factory-fabricated panels, shall be labeled at each end within 2 inches of termination with a cable identifier and other descriptive information.

B. Permanently label or code each point of field terminal strips to show the instrument or item served.

C. Identify control panels with minimum 1-cm letters on laminated plastic nameplates.

D. Identify all other control components with permanent labels. Identifiers shall match record documents. All plug-in components shall be labeled such that removal of the component does not remove the label.

3.08 CLEANING

A. The Contractor shall clean up all debris resulting from his or her activities daily. The contractor shall remove all cartons, containers, crates, etc. under his control as soon as their contents have been removed. Waste shall be collected and placed in a location designated by the Construction Manager or General Contractor.

B. At the completion of work in any area, the Contractor shall clean all of his/her work, equipment, etc., making it free from dust, dirt and debris, etc.

C. At the completion of work, all equipment furnished under this Section shall be checked for paint damage, and any factory finished paint that has been damaged shall be repaired to match the adjacent areas. Any metal cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.09 PROTECTION

A. The Contractor shall protect all work and material from damage by his/her work or workers, and shall be liable for all damage thus caused.

B. The Contractor shall be responsible for his/her work and equipment until finally inspected, tested, and accepted. The Contractor shall protect his/her work against theft or damage, and shall carefully store material and equipment received on site that is not immediately installed. The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.10 FIELD QUALITY CONTROL

A. All work, materials and equipment shall comply with the rules and regulations of applicable local, state, and federal codes and ordinances as identified in Part 1 of this Section.

B. Contractor shall continually monitor the field installation for code compliance and quality of workmanship. All visible piping and or wiring runs shall be installed parallel to building lines and properly supported.

C. Contractor shall arrange for field inspections by local and/or state authorities having jurisdiction over the work.

3.11 ACCEPTANCE

A. Control System: The control systems will not be accepted as meeting the requirements of completion until all tests described in this Specification have been performed to the satisfaction of both the Engineer and Owner.

B. The full range of operation for all Sequences of Operation shall be demonstrated. Where sequences are dependent on season or outside conditions these conditions may be simulated for the purpose of demonstration if approved by both the Architect/Engineer and the Owner. If simulations cannot be acceptably created the Contractor shall perform the demonstration during the proper period.

C. Any tests that cannot be performed due to circumstances beyond the control of the Contractor may be exempt from the Completion requirements if stated as such in writing by the Owner's representative. Such tests shall then be performed as part of the warranty.

END OF SECTION

PART 1 - GENERAL

1.01 MANUFACTURERS

A. Extend and upgrade the existing automatic temperature control system as required for the demolition of the existing HVAC systems being removed and the proposed new HVAC systems being installed in the Auditorium area.
   1. Controls Company: Stark Tech
      a. Phone: (518) 312-6086
      b. Contact: Jason Kross - Market Sales Lead - ENY
      c. Email: krossj@starktech.com
      d. Website: www.StarkTech.com
      e. Address: 581 North State Road, Unit 6, Briarcliff Manor, NY 10510
   2. Port Chester Middle School Contact: Anthony C. Lunde
      a. Title: Maintenance Foreman, Buildings and Grounds
      b. (914) 438-2808 cell
      c. (914) 690-2039 fax
      d. (914) 690-2040 office

1.02 DESCRIPTION OF WORK

A. The Work specified as part of this Section consists of the work required to achieve operational and coordinated Sequences of Operation as described. Work includes coordination of functions of controllers supplied as part of equipment packages, sizing of control valves, interconnection of systems, provision and installation of all accessory devices required for complete system operation, including devices not provided as part of equipment, coordination of start-up and testing, and demonstration of the operation of Sequences of Operation to the Owner and his representatives.

B. The control system operation of all equipment shall be subject to the operational modes, conditions, and logic described in this Section and the controlled equipment manufacturer's recommendations.

C. Training of the owner's personnel in the operation, troubleshooting, adjustment, and repair of all system controls.

1.03 RELATED SECTIONS AND WORK

A. Section 230923 - Automatic Temperature Controls and Building Automation System

B. Section 230991 - Instrumentation and Control Integration

C. Division 26 - Electrical Specifications

D. Owner's Building Management System (BMS)

E. Owner's Fire Alarm System (FAS)

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 GENERAL

A. General
   1. Conform to the requirements of the Owner's standards for all electrical work and devices.
   2. System and system components shall be BACnet compatible.
   3. All set points and operating points shall be able to be transmitted to and set from the BMS system. Specific points to be enabled shall be at the discretion of the Owner.
   4. All systems shall be capable of operating independently of the BMS system based on set points and limits, either input from the BMS system or manually.
   5. Coordinate all work with the requirements and characteristics of the BMS system and the equipment provided for the project under this phase or earlier phases.

6. All space sensors and thermostats shall have an LCD display indicating their set point, the condition sensed, and the mode of operation they are responding to.
7. All equipment to be integrated with the BMS shall be fully integrated with new or existing facility controls and devices, including interlocks, icons, graphics, read-outs, and reports.
8. The automatic temperature control (ATC) system shall be a network of stand-alone direct digital control (DDC) panels for automatic unattended operation of the new HVAC equipment.
9. The ATC system shall be installed by competent mechanics regularly employed by the control system manufacturer or an approved authorized agent with full responsibility for proper operation of the control system, including debugging and proper calibration of each component in the entire system. Refer to control specifications for further responsibilities and requirements.
10. The control sequences below describe all necessary equipment operation, including those operations that are provided by the HVAC equipment manufacturers and those as part of the central control system. Refer to individual equipment specifications for devices provided by the HVAC equipment manufacturers. It is the responsibility of the mechanical contractor to provide a fully coordinated and operational control system.
11. All thermostats, whether provided by the HVAC equipment manufacturer or the controls manufacturer, shall be provided with matching locking metal covers by the controls manufacturer in order to prevent unauthorized tampering and vandalism.
12. Electrical contract work will include 460/277/220/208/120 volt power wiring to motors, HVAC equipment, and control panels.
13. All wiring, including control wiring, shall be installed in appropriately sized E.M.T. Installation of all electrical devices and wiring shall follow wiring methods specified on the electrical contract drawings and specifications.
14. Mechanical contract work will include all control wiring. Power supply wiring to all actuators (valves, dampers, etc.), including low-voltage transformers, shall be provided as part of the mechanical contract.

3.02 FRONT END COMPUTER WORKSTATION (WHERE APPLICABLE)

A. For all new HVAC equipment (rooftop units, ductless split systems, exhaust fans) and cooling upgrades, the front end computer work station shall have all computer graphics updated to show the new and updated HVAC systems, units, and components.

3.03 ROOFTOP UNITS (RTU-1, 2, 3, 4 FOR AUDITORIUM)

A. Open Protocol Interface:
   1. Provide communications module that is plugged into the HVAC unit controller to communicate with the building automation system using an approved protocol such as BACnet, coordinated with the automatic temperature control system.

B. Programmable Zone Sensor:
   1. The programmable zone sensor shall schedule and send the controller Occupied, Morning Warm-up / Unoccupied and Heat / Cool modes commands. If communication is lost with the building automation system, the controller shall operate using default modes and setpoints.

C. Occupied Mode – Single Zone VAV (see drawing schedules) with Energy Recovery:
   1. During occupied periods, the supply fan shall run continuously, and the outside air damper shall open to maintain current airflow setpoint. The unit controller shall control the supply fan variable frequency drive (VFD) to maintain the space temperature setpoint (adj.). The compressors, gas heat, energy recovery wheel (if enabled), and outside air damper (if airside economizing in enabled) shall cycle/modulate to maintain discharge air temperature at setpoint (adj.). Economizer to be controlled by differential enthalpy controls. In economizer mode, the energy wheel shall stop so as not to affect economizer capability. Unit shall have the ability to provide 100% outside air in economizer mode.
   2. Any associated return fans and minimum exhaust fans shall also run in the occupied mode.

D. Unoccupied Mode:

1. When the space temperature is below the unoccupied heating setpoint of 60.0 deg. F (adj.) the supply fan shall start, the outside air damper shall remain closed, and the gas heat shall be enabled. When the space temperature rises above the unoccupied heating setpoint of 60.0 deg. F (adj.) plus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop, and the gas heat shall be disabled.
2. When the space temperature is above the unoccupied cooling setpoint of 85.0 deg. F (adj.) the supply fan shall start, the outside air damper shall open if economizing is enabled and remain closed if economizing is disabled and the DX cooling shall be enabled. When the space temperature falls below the unoccupied cooling setpoint of 85.0 deg. F (adj.) minus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop, the DX cooling shall be disabled, and the outside air damper shall close.

E. Morning Warm-Up Mode:
1. During morning warm-up, if the space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. When morning warm-up is initiated, the unit shall enable the heating and supply fan. The outside air damper shall remain closed. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

F. Pre-Cool Mode:
1. During morning cool-down, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated, the unit shall enable the fan and cooling or economizer. The outside air damper shall remain closed, unless economizing. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

G. DX Cooling Coil:
1. The unit controller shall monitor space temperature and space temperature cooling setpoint to determine when to initiate requests for cooling. When the space temperature rises above the space temperature cooling setpoint, the unit controller shall modulate the economizer or stage the mechanical cooling “On” or “Off” as required to maintain the space temperature cooling setpoint. The first compressor shall energize after its minimum 3-minute off time has expired. The supply fan shall modulate above minimum speed to meet zone requirements. If additional cooling capacity is required, the second stage of cooling shall be enabled. Once the space temperature falls below the setpoint the compressors shall be deactivated, and the fan shall modulate to minimum speed.

H. Hot Water Heating Coil
1. Fan “Off” Mode:
   a. If the outdoor air temperature is low (below 40 degrees Fahrenheit (4.44 degrees Celsius).), then the heating valve is open to the heating coil for freeze protection.
2. Fan “On” Mode (Heating):
   a. If the system is in the heating mode and the fan is on, the control valve shall modulate to maintain setpoint.

I. Economizer Control / Comparative Enthalpy:
1. The supply air sensor shall measure the dry bulb temperature of the air leaving the evaporator coil while economizing. When economizing is enabled and the unit is operating in the cooling mode, the economizer damper shall modulate between its minimum position and 100% to maintain the space temperature setpoint. Minimum position shall be calculated based on supply fan speed. If the mixed air temperature starts to fall below 53.0 deg. F, the economizer starts to close, at 50.0 deg. F, the damper shall be at minimum position. Compressors shall be delayed from operating until the economizer has opened to 100% for 5 minutes.
2. Comparative Enthalpy:
   a. Outside air (OA) enthalpy is compared with Return air (RA) enthalpy point. The economizer shall be enabled when OA enthalpy is less than RA - 3.0 (3.0)/LB. The economizer shall be disabled when OA enthalpy is greater than RA enthalpy.

J. Dehumidification Control:
   1. The rooftop unit has an option for a modulating hot gas reheat coil for a dehumidification control sequence. This control sequence requires the optional hot gas reheat coil along with the space humidity sensor. The humidity sensor is field installed in the occupied space.
   2. The control device is the space humidity sensor. When the space humidity rises above the space humidity setpoint (50%, adj.) the unit shall run in the dehumidification cycle. The speed of the inverter compressor will increase until the leaving cooling coil temperature reaches 50F (adj.). The hot gas reheat coil will modulate to maintain the leaving unit temperature or discharge air temperature (DAT).
   3. When the supply fan application is constant volume, the modulating hot gas reheat coil will modulate between the minimum (55F) and maximum (70F) DAT setpoints to maintain the space temperature setpoint (72F). The minimum, maximum, and space temperature setpoints are all adjustable.
   4. When the supply fan application is variable air volume the hot gas reheat coil is controlled by two different control sequences – one for when the space temperature (or control temperature) is satisfied and another if the control temperature is not satisfied. If the control temperature is satisfied (Below 72F and above 68F) the unit is operating in the fan only state. During this state if the space humidity goes above the space humidity setpoint (50%) the modulating hot gas reheat coil is modulated between the minimum (55F) and maximum (70F) DAT setpoints (both adjustable) to maintain the current control temperature. If the space humidity goes above the space humidity setpoint when the space temperature is above 72F (adj.) the modulating hot gas reheat coil is modulated to maintain the “cooling” discharge air temperature setpoint, 55F default (adj.).
   5. The unit will continue to operate in the dehumidification cycle until the space humidity setpoint is achieved. When the space humidity is satisfied the unit’s operation returns to any of the standard operating states, fan only, cooling, or heating, depending on the space temperature.

K. Supply Fan Operation:
   1. The supply fan shall be enabled while in the occupied mode and cycled on during the unoccupied mode. The unit controller shall vary the supply fan speed to optimize minimum fan speed in all cooling modes. A differential pressure switch shall monitor the differential pressure across the fan. If the switch does not open within 40 seconds after a request for fan operation a fan failure alarm shall be annunciated, the unit shall stop, requiring a manual reset.

L. Exhaust Fan Operation:
   1. The exhaust fan shall be enabled while in the occupied mode and be disabled during the unoccupied mode. A differential pressure switch shall monitor the differential pressure across the fan. If the switch does not open within 40 seconds after a request for fan operation a fan failure alarm shall be annunciated.
   2. The exhaust fan shall have a dual purpose:
      a. Minimum exhaust air to match the minimum outside air serving the energy wheel.
      b. Up to 100% exhaust air (enthalpy economizer) to match 100% outside air.

M. Filter Status:
   1. A differential pressure switch shall monitor the differential pressure across the filter when the fan is running. If the switch closes for 2 minutes after a request for fan operation a dirty filter alarm shall ensue.

N. Auxiliary Devices - Provided with unit and factory-installed:
   1. Condensate overflow switch
   2. Discharge air temperature sensor
   3. Fan failure/clogged filter switch
   4. Duct high limit switch
   5. Supply fan proving switch
   6. Ebtron outdoor air flow measuring station

7. Building static pressure sensor (field-installed)

O. Energy Recovery Wheel System:
1. The energy recovery wheel shall be control by the rooftop unit manufacturer's integral controls.
2. On-Off Control, In The "Off" Position:
3. Energy recovery wheel ERW-1 shall be off when associated supply air handling unit AHU-1 and exhaust air fan EF-1 is off.
4. On-Off Control, In The "On" Position: Energy recovery wheel ERW-1 shall be on and under control of recovery air temperature transmitter TT-2 (located after energy recovery wheel and before air handling unit).
5. Maximum Cooling: Based on summer design day, energy recovery wheel ERW-1 shall be rotating to absorb maximum energy from the exhaust air into the outdoor intake air. Recovery air temperature transmitter TT-2 shall signal ERW-1 to rotate at maximum speed, with recovery air temperature setpoint of TT-2 at 55 degrees Fahrenheit (12.78 degrees Celsius).
6. Minimum Cooling: Same as the "maximum cooling" sequence above because it is assumed that the energy recovery wheel is in a 100% outdoor airstream. With 55 degree F. supply air requirement per TT-2, maximum cooling is needed until outdoor air temperature via temperature transmitter TT-1 drops to within 5 degrees Fahrenheit (-15 degrees Celsius). of exhaust air via temperature transmitter TT-3 (adjustable based on energy recovery wheel selections). At this point, energy equilibrium (no heat transfer) shall be reached, and ERW-1 shall shut off to save electric wheel motor energy. Also, at this point, the "free cooling" benefit of 100% outdoor air will provide TT-2 with the coolest temperature upstream of the AHU-1 cooling coil, versus energy recovery cooling cycle.
7. No Energy Recovery: An outdoor air temperature TT-1 deadband of 5 degrees Fahrenheit (-15 degrees Celsius). above the exhaust air temperature transmitter TT-3, and 5 degrees F. below TT-3, shall prevent ERW-1 from operating.
8. Minimum Heating: When outdoor air temperature via temperature transmitter TT-1 continues to drop 5 degrees Fahrenheit (-15 degrees Celsius). below AHU-1, discharge air temperature transmitter TT-4 (adjustable based on energy recovery wheel selections), energy differential shall be re-established (heat transfer) and wheel ERW-1 shall start. TT-4 shall reset TT-2 energy recovery air temperature setpoint to match TT-4 setpoint (i.e., 62 degrees Fahrenheit (16.67 degrees Celsius).). TT-2 shall modulate from "off" to minimum rotation speed, to preheat outdoor air in series with AHU-1 heat coil.
9. Maximum Heating: When outdoor air temperature continues to drop, TT-2 shall increase wheel speed to full ERW-1 rotation, for maximum energy recovery of exhaust air to outdoor intake air.
10. Frost Protection Option #1: When outdoor air temperature drops to 15 degrees Fahrenheit (-9.44 degrees Celsius). (exact temperature setpoint based on manufacturer's recommendation), energy recovery wheel ERW-1 will reduce rotation speed based on outdoor air temperature to reduce energy recovery performance and prevent condensation and/or frost from forming on the outdoor intake side of ERW-1. Note: Some wheels may not be variable speed. Use Option #2 or 3.
11. Frost Protection Option #2: The unit shall be equipped with an outdoor air temperature sensor and controller such that the energy recovery wheel can be operated in a stop/jog mode during very low outdoor air temperature periods to prevent freezing of the wheel while still delivering outdoor air to the unit.
12. Alarms: The unit shall be equipped with a rotational sensor and controller such that should the energy recovery wheel not rotate during a signaled run period, the controller shall send a 24 volt AC signal suitable for operating a relay to be used as an alarm contact. The controller shall not initiate an alarm during the stop/jog function.

P. Single Zone VAV:
1. In a single zone VAV unit, a variable speed fan controls the amount of airflow provided to the space by modulating the fan motor speed based on the difference between the actual

space temperature and the temperature setpoint. The modulating compressor uses the temperature of the supply air leaving the unit to determine how much refrigerant flow is needed to maintain the supply air temperature setpoint.

2. The fan and compressor continue to modulate to precisely meet the desired space temperature. For part load conditions, the single zone VAV unit will operate at a lower fan speed for a greater amount of time, saving valuable energy and providing the space with more constant temperature and humidity control. HVAC systems generally operate at part load conditions for a majority of the year, and during these part load conditions the operation of a single zone VAV system provides many benefits.
3. First, a single zone VAV system will operate at a lower fan speed than a constant volume system, resulting in less fan energy consumption.
4. Second, with the modulation capabilities of both the fan and compressor a single zone VAV system can provide precise temperature control and additional passive dehumidification.
5. Third, the modulation capabilities of the compressor reduce the amount of compressor on/off cycling, reducing wear on the compressor and providing greater energy savings than hot gas bypass systems.
6. Fourth, lower fan speeds reduce the amount of sound produced by the supply fan.
7. Finally, with the entire modulating control for part load operation provided within the HVAC unit, a single zone VAV system is simple to install, set up and maintain.

3.04 DUCTLESS SPLIT SYSTEMS (INDOOR HEAT PUMP UNIT HP-1 & 2 AND REMOTE CONDENSING UNIT CU-1 & 2 FOR CONTROL ROOMS)

A. General:
   1. Each ductless split system shall be provided with a wall mounted digital thermostat. See floor plan drawings and schedule for outdoor condensing unit that serve an indoor unit.

B. Cooling:
   1. The cooling set point temperature shall be 78 degrees F (adjustable). Upon a demand for mechanical cooling, the associated condensing unit shall be energized and the cooling coil shall be controlled to maintain space temperature.

C. Heating:
   1. The heating set point temperature shall be 70 degrees F (adjustable). Upon a demand for "heat pump" heating, the associated condensing unit shall be energized and the heating coil shall be controlled to maintain space temperature.

D. BMS Interface:
   1. Furnish and install manufacturer's approved BACnet interface module / adapter and tie into wall-mounted thermostat / controller.

3.05 EXHAUST FANS (EF-1 CUSTODIAN CLOSET)

A. The exhaust fans shall be indexed for occupied - unoccupied modes of operation through the ATC system. During the occupied cycle, the respective exhaust fans shall run continuously. During the unoccupied cycle, the respective exhaust fans shall remain off. The exhaust fans shall be interlocked with their respective HVAC units’ occupied - unoccupied modes of operation.

B. Provide a differential pressure switch or current sensor at each of the exhaust fans. The switch/sensor shall provide fan flow status and fan failure to the ATC system.

C. Other approved methods are light switch and/or occupancy sensor.

3.06 DUCT SMOKE DETECTORS

A. A duct smoke detector shall be furnished by the electrical contractor and installed in the ductwork by the mechanical contractor. The electrical contractor shall provide wiring from the duct smoke detector to the associated unit’s motor starter and to the building fire alarm system. Whenever products of combustion are sensed, the unit's fans will shut down.

B. Where indicated on the drawings, the electrical contractor shall provide wiring from the building’s fire alarm system to a set of contacts at the HVAC unit’s control panel to indicate a fire alarm condition and for secondary shutdown.

C. Where indicated on the drawings, the mechanical contractor shall provide wiring from an additional set of contacts from the duct smoke detector to the HVAC unit's control panel to indicate a fire alarm condition and for secondary shutdown.

3.07 FREEZESTAT

A. A two-pole freezestat shall be installed on the leaving side of all heating coils. One set of contacts is wired in series with the unit duct smoke detector for fan shutdown. A second set of contacts closes when the device is tripped, sending an alarm signal to the control panel

3.08 MOTOR STARTERS OR VARIABLE FREQUENCY DRIVES

A. All safety devices shall be wired so they stop the motor with the hand-off-auto switch in the hand as well as the auto position. This will normally mean breaking the common wire from the hand-off-auto switch to the starter's holding coil through the safety devices.

3.09 CONDENSATE OVERFLOW PROTECTION

A. All units with cooling coils shall require a condensate level alarm (unless the drawings specifically show a secondary drain or auxiliary drain pan with a separate drain as describe in the International Mechanical Code Section 307, Condensate Disposal). The controls shall be capable of monitoring a field supplied and installed condensate level sensor. Whenever the sensor detects a high condensate level condition through the condensate level switch, the controls shall disable any active mechanical cooling and generate an alarm.

3.10 CO2 SENSORS

A. Provide redundant CO2 sensors for assembly areas or areas indicated on the drawings (conference rooms, auditoriums, cafeterias, gyms, etc.) where occupancy can greatly vary during the day. Wall mounted CO2 sensor shall have a maximum range of 0-2000 ppm. When the CO2 level exceeds 850 ppm (adjustable), the unit shall go into the occupied mode and outside air shall be provided. Outdoor air levels are typically assumed to be 400 ppm. As CO2 levels go up, occupants can become uncomfortable, unproductive, and tired. ASHRAE Standard 62 recommends enough outside air be brought in to keep CO2 levels below 1,000 ppm maximum.

3.11 DEMAND CONTROL VENTILATION (DCV)

A. Demand Control Ventilation shall be provided for the HVAC systems. DCV is an energy-saving control strategy that reduces the rate at which outdoor air is delivered to a zone during periods of partial occupancy.

B. DCV is a feedback control method to maintain indoor air quality that automatically adjusts the ventilation rate provided to a space in response to changes in conditions such as occupant number or indoor pollutant concentration. The control strategy is mainly intended to reduce energy use by heating, cooling, and ventilation systems compared to buildings that use open-loop controls with constant ventilation rates.

C. References:
   1. ISO ICS 91.140.30: Ventilation and air-conditioning systems.
   2. ASHRAE 62.1 & 62.2: The standards for Ventilation and Indoor Air Quality.
   3. ASHRAE 90.1.

D. Methods of Estimating Occupancy:
   1. Gas Detection - CO2 Sensors.
   2. Motion or Occupancy Sensors.
   3. Timed Schedules.

E. CO2 Sequence
   1. Demand control ventilation shall modulate the position of the HVAC unit's outdoor damper (from fully closed to the minimum design outdoor air ventilation position) based on the amount of CO2 measured by the space CO2 sensor.
   2. Demand Control Ventilation shall comply with the "Manual of Planning Standards, 2022, The University of the State of New York, The State Education Department" including:
      a. Appendix I: Demand Control Ventilation including:

1) I007 Requirements for Demand Control Ventilation Using CO2 Sensors

3. Highlights of I007 Requirements for Demand Control Ventilation Using CO2 Sensors
   a. Requirements applicable to all DCV systems shall also apply to those systems using CO2 sensors.
   b. Sensors shall have the following requirements:
      1) Sensors must be located at points that are reflective of the breathing zone of each space served.
         (a) Sensor location(s) must avoid impact of doorways, windows, short circuiting, and supply air vents.
         (b) An adequate number of CO2 sensors must be provided for each space.
      2) Sensor quality:
         (a) Error not to exceed 50 parts per million (ppm) in expected range of measurement.
         (b) Drift not to exceed 20 ppm.
      3) Redundant CO2 sensors shall be provided at each location installed. If the difference in reading between sensors at the same location exceeds ten percent (10%), both sensors will require calibration.
      4) Measurement of outside air CO2 concentrations are not required. An assumed value of 350 ppm may be used in determining ambient CO2 concentration.
      5) Sensors shall take measurements (readings) in each space at intervals not to exceed 1 minute.
4. A minimum volumetric flow of outside air must be provided during occupied times.
      1) Minimum flow rate must consider dilution of non-occupant generated contaminants as well as make-up air requirements of all spaces served by the unit (i.e. make-up air delivered to locker rooms from gymnasium).
         (a) If not providing make-up air to other spaces requiring greater flow rates of outside air, the minimum volumetric flow rate of outside air for large spaces (Gyms with spectator seating, Auditoriums, Cafeterias, Band/Choir rooms, Large Group Instruction) shall be at least twenty percent (20%) of volumetric flow rate of outside air for the maximum occupant load of the space.
         (b) Classrooms: If not providing make-up air to other spaces requiring greater flow rates of outside air, the minimum volumetric flow rate of outside air shall be at least twenty-five percent (25%) of volumetric flow rate of outside air for the maximum occupant load of the space.
   b. Preoccupancy purge: If the sequence does not include a provision for minimum ventilation rate, 24 hours per day, 365 days per year, a purge of the space is required prior to occupancy. A preoccupancy purge cycle shall consist of a 30-minute operation of the air handling systems, serving the area, with all dampers (outside air, return air, exhaust air, relief air) positioned, and all fans running to provide the quantity of outside air for the maximum occupant loading of the space.
   c. Post Occupancy Flush: Air handling systems, serving the area, must operate after the occupied times to reduce CO2 concentrations in the space to outside air levels, prior to shutting down. Dampers (outside air, return air, exhaust air, relief air) must be positioned, and all fans must run at speeds to provide at least the minimum flow rate of outside air during the post occupancy flush.
   d. Provide provision for economizer override of CO2 control when conditions permit natural cooling of space(s) served.
   e. Upper limit of CO2 (ppm) must be provided. The upper limit (Control Point) must be based on the metabolic rate of activities in area and the volumetric flow rate required by Code for the area served.
   f. Air handling system control during occupied times: All dampers and fans serving a space shall modulate from the minimum setting, starting at an interior CO2 concentration of not greater than 100 ppm over that of the outside air. Dampers and fans shall modulate such that concentrations never exceed upper limit for space.

g. Provide provision for a proportional-integral or a proportional-integral-derivative CO2 controller.
h. DCV through the use of CO2 sensors may not be used where there is a provision to remove CO2 by any method other than dilution.
i. Provide provision for extended commissioning (1 year) to check calibration of CO2 sensor, monitor/test CO2 levels to ensure target per person ventilation rates are met and maintained
j. Record keeping: Records to be provided to School District's Health and Safety Committee.
    1) CO2 concentration readings from all sensors serving each space must be recorded at not greater than 15-minute intervals. Records of CO2 concentrations must be kept for a minimum of three years.
    2) Air flow readings are recommended

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the pipe, valves, fittings, and joining materials for use with the piping systems described in this Section and as shown on the Drawings.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 079201 - Non-Fire Rated Sleeves and Seals

C. Section 230529 - Pipe Hangers and Supports

D. Section 230555 - Mechanical System Identification

E. Section 230700 - Pipe Insulation

F. Section 232007 - Piping Specialties

1.03 ABBREVIATIONS

A. The following are standard abbreviations:
   1. CWP: Cold working pressure.
   2. EPDM: Ethylene-propylene-diene-terpolymer rubber.
   3. NRS: Nonrising stem.
   4. OS&Y: Outside screw and yoke.
   5. PTFE: Polytetrafluoroethylene plastic.
   6. TFE: Tetrafluoroethylene plastic.
   7. NPS: Nominal Pipe Size

1.04 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Piping Product Data Submittal
      a. Product Data: For each type of valve indicated: Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.
      b. Product data on pipe, fittings, gaskets, and bolts. Include dimensions, specifications, and manufacturer. Provide pipe and valve application schedule.
      c. Provide product data, including but not be limited to dimensions, specifications, manufacturer, installation and operation instructions, temperature and pressure ratings, end connections, and required clearances on piping specialties included in this Specification.
      d. Welder Certifications - Furnish the names of pipe welders and welding operators employed by the Contractor to perform the Work who have been qualified to use the welding procedures which have been qualified in accordance with the specified pressure piping codes or AWS or NFPA standards.
   2. Piping Shop Drawings
      a. Where deviations from the Drawings and Specifications are proposed for any reason, submit shop drawings identifying proposed deviations showing layout of all piping, fittings, materials, dimensions, and fabrication and installation details. Submit a comparison table of the specified features and ratings of the specified item and those of the proposed deviation to allow a direct comparison.
      b. The review of deviations will be for pressure drop only. The review will not address clearances or accessibility. No dimensional or coordination check will be made.
      c. The Contractor has the sole responsibility to review the Drawings, coordinate piping fabrication, and provide clearances and access for installation, maintenance and

balancing of this Work, and Work of other trades. Unless specifically dimensioned, Drawings indicate approximate locations only. The Contractor has the sole responsibility to locate and route the piping.

d. Submit all layout shop drawings on not less than ¼ inch equals 1 foot scale drawings.

1.05 REFERENCES

A. Division 01 - Quality Control: Requirements for references and standards.

B. AGA Z21.22 - Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.

C. ANSI C111 - Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings

D. ASME B16.3 - Malleable Iron Threaded Fittings.

E. ASME B16.5 - Steel Pipe Flanges and Flanged Fittings

F. ASME B16.9 - Factory-Made Wrought Steel Buttwelding Fittings

G. ASME B16.15 - Cast Bronze Threaded Fittings

H. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

I. ASME B16.22 - Wrought Copper and Bronze Solder Joint Pressure Fittings.

J. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.

K. ASME B16.24 - Cast Copper Alloy Pipe Flanges and Flanged Fittings.

L. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.

M. ASME B16.39 - Pipe Unions, Malleable Iron Threaded

N. ASME-B31.1 - Power Piping.

O. ASME B31.2 - Fuel Gas Piping.

P. ASME B31.5 - Refrigeration Piping.

Q. ASME B31.9 - Building Service Piping.

R. ASME B36.10M - Welded and Seamless Wrought Steel Pipe

S. ASME SEC IV - Construction of Heating Boilers.

T. ASME SEC IX - Welding and Brazing Qualifications.

U. ASTM A47 - Ferritic Malleable Iron Castings

V. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.

W. ASTM A74 - Cast Iron Soil Pipe and Fittings.

X. ASTM A105 - Forgings, Carbon Steel, for piping components.

Y. ASTM A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings

Z. ASTM A181 - Forgings, Carbon Steel, for General Purpose Piping

AA. ASTM A197 -Cupola Malleable Iron

BB. ASTM A234/A234M - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

CC. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile

DD. ASTM B32 - Solder Metal.

EE. ASTM B42 - Seamless Copper Pipe.

FF. ASTM B62 - Composition Bronze or Ounce Metal Castings

GG. ASTM B75 - Seamless Copper Tube

HH. ASTM B88 - Seamless Copper Water Tube.

II. ASTM B306 - Copper Drainage Tube (DWV).

JJ. ASTM B584 - Copper Alloy Sand Castings for General Applications

KK. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

LL. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.

MM. AWS A5.8 - Specification for Brazing Filler Material

NN. AWWA C651 - Disinfecting Water Mains.

OO. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.

PP. NFPA 30 - Flammable and Combustible Liquids Code

QQ. NFPA 54 - National Fuel Gas Code.

RR. NSF 61 - Domestic Water Pipe, Valves, and Fittings.

SS. Mechanical Code of New York State-Latest Edition

TT. Plumbing Code of New York State-Latest Edition

UU. Fuel Gas Code of New York State-Latest Edition

VV. FM - Factory Mutual Compliance

WW. UL - Underwriter's Laboratory Compliance

1.06 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
   1. Protect internal parts against rust and corrosion.
   2. Protect threads, flange faces, grooves, and weld ends.
   3. Set angle, gate, and globe valves closed to prevent rattling.
   4. Set ball and plug valves open to minimize exposure of functional surfaces.
   5. Set butterfly valves closed or slightly open.
   6. Block check valves in either closed or open position.

B. Use the following precautions during storage:
   1. Maintain valve end protection.
   2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use hand wheels or stems as lifting or rigging points.

D. Protect all flange faces with wood, plastic or soft metal to prevent damage to parts.

E. Protect all pipe threads from damage with plastic plugs or caps.

F. Mark and identify all piping materials in accordance with the Reference Standards specified herein.

PART 2 - PRODUCTS

2.01 GENERAL

A. When two or more valves of the same type are used in the same service, furnish all valves of this type from the same manufacturer.

B. Specific manufacturer's model numbers are cited in the following Piping Material Schedules to establish the desired quality and performance for each type valve or material. Equivalent products by other approved manufacturers are also acceptable. Approval shall be subject to review by the Architect/Engineer.

2.02 HEATING HOT WATER PIPING

ITEM	PIPE SIZE	DESCRIPTION	MANUFACTURER/ MODEL NO.
PIPE	2 INCHES AND SMALLER	TYPE L, HARD DRAWN COPPER TUBING, ASTM B88	MUELLER INDUSTRIES WHEATLAND

ITEM	PIPE SIZE	DESCRIPTION	MANUFACTURER/ MODEL NO.
	2 ½ INCHES AND LARGER	SCHEDULE 40, SEAMLESS STEEL, ASTM A 53 GRADE B	
JOINTS	2 INCHES AND SMALLER 2 ½ INCHES AND LARGER	LEAD-FREE SOLDER, ASME B32; WATER SOLUBLE FLUX, ASTM B-813 WELDED CONNECTIONS	J.W. HARRIS-BRIDGIT
FITTINGS	2 INCHES AND SMALLER 2 ½ INCHES AND LARGER	CAST COPPER ALLOY OR WROUGHT COPPER ASME B16.18 OR ASME B16.22 STANDARD WEIGHT, SEAMLESS STEEL, BUTT WELDED, ASTM A234	NIBCO WELDBEND
FLANGES	2 ½ INCHES AND LARGER	150#, FORGED STEEL, WELD NECK, BORE TO MATCH PIPE ID, ASTM A181	WELDBEND
BOLTS	ALL SIZES	ALLOY STEEL, HEX HEAD BOLTS AND NUTS, ASTM A307 GRADE B	
UNIONS	2 INCHES & SMALLER	WROUGHT COPPER, SOLDER UNIONS, ASME B16.22	NIBCO
DIELECTRIC UNIONS	2 1/2 INCHES & SMALLER	DIELECTRIC TYPE, COPPER TO STEEL	WATTS REGULATOR SERIES 3000
GASKETS	ALL SIZES	SPIRAL WOUND METALLIC GASKETS	FLEXITALLIC STYLE LS/LSI
BALL VALVES	2 INCHES & SMALLER	TWO-PIECE, FULL-PORT, SOLDERED ENDS, BRONZE BODY, TYPE 316 STAINLESS-STEEL VENTED BALL AND STEM, REINFORCED TFE SEATS, 150 PSIG SWP AND 600-PSIG CWP RATINGS. MSS SP-110, ASTM B 584 ALLOY C84400, ASME B1.20.1	NIBCO S-585-70-66

ITEM	PIPE SIZE	DESCRIPTION	MANUFACTURER/ MODEL NO.
CHECK VALVES	2 INCHES & SMALLER 2 ½ INCHES & LARGER	CLASS 125, Y-PATTERN SWING TYPE, SOLDERED CONNECTIONS, BRONZE BODY WITH TFE SEAT DISC. MSS-SP80, ASTM B 62 CLASS 125, SWING-TYPE, FLANGED CONNECTIONS, CAST IRON BODY WITH BRONZE TRIM, NON ASBESTOS GASKET. MSS-SP71, ASTM A-126 CLASS B	NIBCO S413-Y NIBCO F918-B
BUTTERFLY VALVES	2 ½ INCHES & LARGER	FULL-LUG TYPE WITH DUCTILE-IRON BODY, ONE-PIECE TYPE 416 STAINLESS-STEEL STEM, COPPER BUSHING, ALUMINUM-BRONZE DISC, AND MOLDED-IN EPDM SEAT. VALVE SIZES 2 ½" THROUGH 6" SHALL HAVE LEVER LOCK OPERATOR; VALVE SIZES 8" AND LARGER SHALL HAVE WEATHERPROOF GEAR OPERATOR. MSS SP-67	NIBCO LD-2000-3/5
BALANCING VALVES	2 INCHES & SMALLER	PROVIDE BALL OR GLOBE STYLE WITH FLOW BALANCING AND SHUT-OFF CAPABILITIES, MEMORY STOPS, AND MINIMUM TWO METERING PORTS. FEMALE SWEAT, NPT THREADED, OR PRESS CONNECTIONS TO MATCH SYSTEM PIPING. BRONZE, BRASS OR STEEL CONSTRUCTION CONSISTENT WITH SYSTEM TEMPERATURE AND PRESSURE. MINIMUM DESIGN PRESSURE AND TEMPERATURE SHALL BE 175 PSIG AT 250 DEG F. PROVIDE WITH UPSTREAM STRAINER.	ARMSTRONG CBV B&G CIRCUIT SETTER IMI STAS/ATAD

ITEM	PIPE SIZE	DESCRIPTION	MANUFACTURER/ MODEL NO.
BALANCING VALVES	2 ½ INCHES & LARGER	VALVE SHALL BE OF CAST IRON CONSTRUCTION WITH 125 PSI ANSI FLANGED CONNECTIONS SUITABLE UP TO 175 PSI WORKING PRESSURE. VALVES 2-1/2"-3" PIPE SHALL HAVE A BRASS BALL WITH GLASS AND CARBON FILLED TFE SEAT RINGS. VALVES 4"-12" SHALL BE FITTED WITH A BRONZE SEAT, REPLACEABLE BRONZE DISC WITH EPDM SEAL INSERT, AND STAINLESS STEEL STEM. 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 SETTING. VALVES TO BE LEAK-TIGHT AT FULL RATED WORKING PRESSURE. DESIGN PRESSURE AND TEMPERATURE SHALL BE 175 PSIG AT 250 DEG F. PROVIDE WITH UPSTREAM STRAINER.	BELL AND GOSSETT CIRCUIT SETTER

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Unless otherwise shown, route piping in the most direct manner parallel to building lines in accordance with the Drawings. Group piping whenever practical at common elevations.

B. Accurately align, support and connect piping without forcing.

C. Locate piping so that access to and clearance around equipment, and minimum piping headroom of 6'-8" is maintained, except where otherwise shown.

D. Space piping so that insulation and flanges, if any, have at least 1 inch clearance after maximum movement.

E. Where pipe elevations are not shown, pitch supply and return lines to positive drain points and/or coils.

F. Provide accessible flanges or union connections on the supply and return connections of terminal equipment and other items which must be disconnected for maintenance. Where unions are furnished as an integral part of the equipment, additional unions are not required unless required for access to or removal of components. Arrange equipment piping connections so that maintenance can be made without removing large sections of pipe or relocating the equipment.

G. Connect branch lines in steam service and compressed air to the top or upper half of the line, preferably the top.

H. Use fittings for all changes of direction. Bending of steel pipe is not permissible.

I. Clean all piping materials before installation to remove grease, loose dirt, mill scale and other foreign matter.

J. Provide air vents at all high points of water piping, and valved drains at all low points of water piping for complete venting, draining and flushing of the piping system. Locate and provide air vents at multiple high points that are necessary to prevent air binding in the piping system. Install additional air vents and drains if directed by the Architect/Engineer, at no cost to the Owner. As a minimum provide drains and air vents
   1. In each section of piping separated by valves.
   2. On all coils.
   3. For each riser, where riser or runout to riser has a valve installed.
   4. In low point of piping to each down fed convector or radiator.

K. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Provide loops, pipe offsets and anchors.

L. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

M. Install gate or ball valves for shut-off and to isolate equipment, parts of systems, or vertical risers.

N. Sleeve pipes passing through partitions, walls and floors.

O. Identify piping under provisions of “Mechanical System Identification” Specification.

P. Provide escutcheons at all locations where piping installed exposed to view penetrates wall, partitions, floors and ceilings.

Q. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

R. Install flexible connectors at inlet and discharge connections of pumps and other vibration producing equipment.

S. Install strainers on the supply side of each control valve, pressure regulating valve, solenoid valve, trap, and elsewhere as indicated.

T. For pressurized liquid piping systems installed horizontally make reductions in pipe sizes using eccentric reducer fitting installed with the level side up to allow air venting.

U. For all nipples up to and including six inches in length provide extra-heavy shoulder type. For all nipples over six inches in length provide corresponding material, quality and thickness as the pipe on which they are used. Do not use close nipples. Provide nipples with designation mark of the manufacturer conforming to the ASTM pipe specifications for system served.

V. Make connections to all cooling and heating units with single or multiple cooling or heating coils in accordance with the manufacturer’s instructions and labeling on equipment

W. For pressures over 15 psig, use nipples and caps instead of plugs for permanent closures. Plugs in equipment provided by equipment manufacturers are acceptable.

X. Do not install piping above electrical panels. Route piping around panels.

3.02 THREADED CONNECTIONS

A. Ream pipe ends to remove burrs.

B. Use only standard ANSI taper threads. Threads shall be full, sharp, clean, and free of fins and burrs.

C. Apply joint sealing tape or paste to male threads only. Do not use paste on compressed air lines. When sealing fuel oil piping, use a thread-sealing compound suitable for oil when making up joints. When sealing natural gas piping, use a thread-sealing compound suitable for natural gas when making up joints.

D. Do not use close or short nipples of a size where the length of unthreaded pipe is less than the width of a pipe wrench.

E. Thredolets or similar code-approved fittings may be used for branch connections.

F. Provide unions at all threaded valve locations to facilitate the removal of the valve.

G. Joint Sealing Compound; Hercules, RectorSeal or approved equal.

3.03 WELDED CARBON STEEL CONNECTIONS

A. Perform welding using qualified welders and procedures following specified reference standards.

B. Do not use mitered welds for elbows.

C. Welded branch connections may be used in place of welding tees provided that requirements of the applicable ASME Code for pressure piping, B31.1 and/or B31.9 are met.

D. Weldolets or similar code-approved fittings may be used for branch connections.

E. Qualifications of welders, welding procedures, performance of welders and welding operators are required complying with the requirements of ASME B31.9 and ASME Boiler and Pressure Vessel Code, Section IX. Keep records and certifications required by code on file and available for inspection.

F. Whenever welding is done close to walls, floors or building structure, thoroughly clean the surfaces of weld splatter. Remove weld splatter from the surface of all welds, pipe and pipe supports.

G. Provide long radius pattern for welding elbows unless otherwise shown on the Drawings.

H. Examine and inspect welded pipe joints as follows:
   1. Visually examine all welded pipe joints for imperfections using qualified representatives. Submit qualifications to the Architect/Engineer.
   2. Make available to the Architect/Engineer records of visual examinations upon request.
   3. Remove weld defects by grinding or chipping and repair or replace joints in accordance with approved procedures.
   4. Make shop and field welded joints available to the Owner for nondestructive inspection and examination upon request.

3.04 FLANGED CONNECTIONS

A. Arrange flange bolt holes to straddle the pipe vertical and horizontal centerlines, and match the orientation of mating flanges.

B. Install piping to equipment without strain.

C. Provide gaskets at all flanged connections suitable for the design and temperature of the fluid contained, and in accordance with Part 2 of this Section.

D. Mate flat face flanges together and raised face flanges together.

3.05 COPPER TUBING CONNECTIONS

A. Provide soldered or brazed in accordance with Part 2 of this Section.

B. Make soldered and brazed connections in accordance with the procedures in the current edition of the Copper Tube Handbook of the Copper Development Association.

C. Qualifications of brazers, brazing procedures, and performance of brazers and brazing operators are required in compliance with the requirements of ASME B31.1, ASME B31.9, and the Boiler and Pressure Vessel Code, Section IX. Keep records and certifications required by the code on file and available for inspection.

D. Make solder joints on all copper water piping with 95/5 solder. Absolutely no lead-based solder will be accepted.

E. Clean joints thoroughly before soldering.

F. Remove excess solder and flux with a cloth or brush to leave a uniform clean fillet.

G. For refrigeration copper tubing connections, comply with ASME B31.5. Make brazed joints on all refrigeration piping.

3.06 CONNECTIONS OF DISSIMILAR METALLIC MATERIALS

A. Isolate connections between dissimilar metallic materials using dielectric connections. Use dielectric unions or flanges that provide a complete isolation of the two ends, including bolts for flanges, using materials suitable for the design pressure, temperature and fluid contained.

3.07 VALVES

A. Provide valves of the same size as the pipe in which they are installed, unless shown otherwise on the Drawings. At pumps, match valve size to pipe size and not pump connection size.

B. Install valves with the stem on or above the horizontal. Install valves with the stem horizontal if requirements of headroom, access or chain operation must be met.

C. Pack valves and adjust glands before final acceptance.

D. Install valve extension stems or chain operators where the center of valve hand wheels is more than 6 feet-6 inches above the floor and valve is 2 ½" and larger. Prove chain hooks where required to prevent fouling of chains on equipment and to clear walkways. Terminate chains approximately 3 feet-6 inches above the floor. Provide worm gear operators or impact hand wheels for all valves 6 inches and larger.

E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation and a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation.

F. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

G. Locate valves for easy access and provide separate support where necessary.

H. Install check valves for proper direction of flow and as follows:
   1. Swing Check Valves: In horizontal position with hinge pin level.
   2. Lift Check Valves: With stem upright and plumb

I. Install butterfly valves with stems horizontal to allow support for the disc and the cleaning action of the disc.

J. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

K. Install balancing valves with lengths of straight pipe upstream and downstream of valve as per manufacturer's instructions such that calibrated accuracy is maintained As a minimum provide straight lengths as per the following table;

REQUIRED STRAIGHT LENGTHS

VALVE SIZE	UPSTREAM (IN PIPE DIAMETERS)	DOWNSTREAM (IN PIPE DIAMETERS)
½"-3"	3	1
4"-12"	5	2

A. Chain wheel Actuators- Valve actuation assembly with sprocket rim, brackets, and chain.

1. Sprocket rim with Chain guides: Ductile Iron (Aluminum for applications exposed to weather), of type and size required for valve.
2. Brackets: Type, number, size, and fasteners required to securely mount actuator on valve.
3. Chain: Stainless steel, of size required to fit sprocket rim.
4. Manufacturers:
   a. Babbitt Steam Specialty Co.
   b. Roto Hammer Industries

3.08 CONTROL VALVE INSTALLATION

A. Install all control valves so that the stem position is not more than 60 degrees from the vertical up position.

B. Install valves in accordance with the manufacturer's recommendations.

C. Install control valves so that they are accessible and serviceable, and such that actuators may be serviced and removed without interference from structure or other pipes, ducts and/or equipment.

D. Install isolation valves at control valves such that control valve body may be serviced without draining the supply/return side piping system. Install unions at all connections to screwed type control valves.

3.09 PRESSURE TESTING, FLUSHING AND CLEANING

A. Pressure test piping systems in accordance with applicable codes and as described herein.

B. Pressure testing - Schedule pressure testing so that it may be witnessed by the Architect/Engineer, Owner, or their representative. Perform tests in accordance with the following procedures:
   1. Before testing, complete the installation of each pipe line, including final supports, hangers and anchors. Perform testing before insulation or paint is applied for examination during the test. Clean piping and equipment of metal cuttings and foreign matter as they are installed.
   2. Codes - Pressure test piping to assure integrity of material and workmanship in accordance with the applicable ASME Code for pressure piping (B31) and New York State Code.
   3. Protection of Equipment - Protect equipment, instruments and piping specialties which are not included in the test by either disconnecting from the piping and blanking off the end of the pipe with a blind flange, plug or cap, or isolating by insertion of a line blind or spool piece as required. Disconnect pneumatic control lines and close all openings.
   4. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
   5. Piping may be tested in sections or circuits as required for the progress of the work.
   6. Provide all systems to be pressurized with the appropriate gauges, certified calibrated by the manufacturer, and pressure-relieving devices.
   7. Install relief valve set at a pressure no more than 1/3 higher than the test pressure, to protect against damage by expansion of liquid or other source of overpressure during the test. Do not allow test pressure to exceed maximum pressure for any vessel, pump, valve, or other component in system under test.
   8. Records - Provide records of all tests showing line designation, test pressure, ambient temperature, date of test, retests and signature of witness.

C. Pneumatic Test Procedures - Perform pneumatic testing in accordance with ASME B31.9
   1. Prior to application of full pneumatic test pressure, perform a preliminary test at 10 psig for a minimum of ten (10) minutes to reveal any major leaks.
   2. After the preliminary test, apply pressure gradually in stages until test pressure is reached.
   3. Test durations:
      a. For all systems the minimum test duration is that required to thoroughly examine the system for leaks.
      b. For all other systems maintain test pressure for a minimum of ten (10) minutes without fluctuation.

4. Check all joints, valves, etc. for leaks with a thick soap-water solution.
5. Repair leaks as specified under “Repair of Line Leaks”.
6. Repeat pneumatic test until there are no leaks.
7. Ensure that adequate protection is provided to prevent injury to persons or property during leak testing.
8. Test systems to the pressure indicated under “Pressure Testing Schedule”

D. Hydrostatic Test Procedures - Perform hydrostatic testing in accordance with ASME B31.9.
1. Perform test using the pressure indicated under “Pressure Testing Schedule”
2. After hydrostatic test pressure has been applied for at least two hours, examine piping, joints, and connections for leakage while maintaining test pressure. Repeat hydrostatic test until there are no leaks.
3. Repair leaks as specified under “Repair of Line Leaks”

E. Service Testing - Perform service testing in accordance with ASME B31.9.
1. For gases and steam and condensate service not over 15 psig, and for nontoxic, noncombustible, nonflammable liquids at pressures not over 100 psig and temperatures not over 200 degrees F a system test with the service fluid is acceptable. This exemption does not apply to natural gas piping.
2. Bring the piping system up to operating pressure gradually with visual examination at a pressure between one-half and two-thirds of design pressure. Make a final examination at operating pressure.
3. Repair leaks as specified under “Repair of Line Leaks”
4. Repeat service test until there are no leaks.

F. Repair of Line Leaks - Comply with the following procedures for repair of leaks. In each case retest after repairs are made.
1. Soldered/Brazed Joints - Remove solder/brazing alloy and reapply with proper flux.
2. Flanged Joints - Check to determine flange end alignment and that all bolts are uniformly tightened with the required torque. If leak persists, depressurize the line, remove gasket, examine flange end face, and insert new gasket.
3. Threaded Joints - Tighten joint to a required torque. If leak does not stop, replace pipe and/or fittings. Do not use pipe dope, cement or seal weld to stop pipe leaks.
4. Gasketed Joints - Remove existing gasket and insert new gasket.
5. Welded Steel Joints - Repair pipe in accordance with applicable ASME B31 code.
6. Leaks in Material - Leaks located in pipe or fitting material require the replacement of that section of pipe or fitting and a repeat of the entire system using the complete procedure required for that system. Caulking, welding or epoxy is not permitted. Repair all damage caused by leaks.

G. Flushing - Complete pressure testing requirements prior to flushing. Performance of the flushing may be witnessed by the Architect/Engineer, Owner, or their representative, provide ample notification to all parties in advance of flushing any system. Perform system flushing in accordance with the following procedures:
1. Flush all main and branch steam and liquid piping systems after pressure testing is complete with new potable water while draining the system at all low points. Isolate all connected equipment and flush individually.
2. Flushing for piping and equipment will be considered complete when water samples taken at all low points indicate clear discharge-with no visible solids. If not clear, continue flushing and sampling until discharge is clear.

H. Cleaning - Complete flushing requirements prior to cleaning. Performance of the cleaning may be witnessed by the Architect/Engineer, Owner, or their representative, provide ample notification to all parties in advance of cleaning any system. Perform system cleaning in accordance with the following procedures:
1. Clean hot water/chilled water lines as described below:

a. When flushing discharge is clear, fill piping systems with water and sufficient approved alkaline cleaning material to remove dirt, oil and grease. Include all connected equipment in the cleaning.
b. Vent system and place in operation, with automatic controls operating at set point temperature or an operating temperature designated by the Architect/Engineer. Circulate the solution through the system for a minimum of 4 consecutive hours.
c. After 4 hours, drain system and flush with clean water until the pH at the farthest drain matches the clean water input. Keep strainers unplugged during the cleaning operations. Refill system with clean water.

2. Clean temporary pump strainers and strainers at coils, etc. every 2 hours periodically during cleaning procedures. Do not remove temporary strainers until all cleaning steps are completed and the operation of the system indicates that the system is free of all foreign matter.
3. Blow out all piping and equipment after cleaning and final flushing is completed and the system is drained with clean dry instrument air for a minimum of 15 minutes or until all water is expelled from the system. Upon completion seal the system by closing all drains and vents.
4. Following the Architect/Engineer approval of the above flushing and cleaning procedures, immediately fill each system and chemically treat and monitor in accordance with the "Chemical Treatment Systems" specifications.

I. Pressure Testing Schedule:

SERVICE	TEST TYPE	DESIGN OPERATING PRESSURE (PSIG)	TEST PRESSURE (PSIG)
FUEL OIL PIPING	**PNEUMATIC**		**1.25 TIMES MAXIMUM WORKING PRESSURE**
STEAM PIPING	**HYDROSTATIC**		**1.5 TIMES MAXIMUM WORKING PRESSURE, BUT NOT LESS THAN 100 PSI**
CONDENSATE PIPING	**HYDROSTATIC**		**1.5 TIMES MAXIMUM WORKING PRESSURE, BUT NOT LESS THAN 100 PSI**
NATURAL GAS PIPING	**PNEUMATIC**		**1.5 TIMES MAXIMUM WORKING PRESSURE BUT NOT LESS THAN 3 PSIG**
NATURAL GAS	**PNEUMATIC**		**WORKING PRESSURES UP TO 12" W.C. = 15 PSIG TEST**

PIPING (IN SCHOOLS)			**PRESSURE FOR 1 HOUR. WORKING PRESSURES ABOVE 12" W.C. = 1.5 TIMES THE WORKING PRESSURE OR A MINIMUM OF 50 PSIG FOR 1 HOUR.**
DOMESTIC WATER PIPING	**HYDROSTATIC**		**1.5 TIMES MAXIMUM WORKING PRESSURE, BUT NOT LESS THAN 100 PSI**
CONDENSER WATER SUPPLY & RETURN	**HYDROSTATIC**		**1.5 TIMES MAXIMUM WORKING PRESSURE, BUT NOT LESS THAN 100 PSI**
HEATING HOT WATER SUPPLY & RETURN	**HYDROSTATIC**		**1.5 TIMES MAXIMUM WORKING PRESSURE, BUT NOT LESS THAN 100 PSI**

3.10 PAINTING

A. Upon completion of the installation, remove all protecting materials, thoroughly remove all scale and grease and leave in a clean condition for painting. Paint in accordance with the requirements of the "Painting" Specification Section.

3.11 PIPE FREEZING

A. Where pipe freezing is required because of the lack of isolation valves, completely freeze piping using a jacket of liquid nitrogen. Provide the services of a company specializing in pipe freezing to perform the Work. Submit to the Architect/Engineer evidence that the company has performed this work for at least 5 years.

B. Approved Manufacturer's:
   1. Freeze Tech, Inc.
   2. Pro Tapping, Inc.

3.12 HOT TAPPING

A. Provide a hot tapping tool for cutting holes in piping under pressure without interrupting system operation and without release or loss of fluid.

B. Provide hot taps to permit new tie-ins to existing piping systems, insertion of flow meters, and permanent or temporary bypasses.

C. Hot tap rating, ½ through 48 inch line size: 1500 psig maximum operating pressure at 100 degrees F and 750 degrees F maximum operating temperature at 700 psig.

D. Provide the following information on the line to be tapped to the hot tap vendor before starting the Work:
   1. Line size, wall thickness, and pipe material.
   2. Fluid in line, and operating pressure and temperature.
   3. Dimensional information and restrictions, if any.
   4. Tap size and orientation (if other than 90 degrees perpendicular to run of the pipe, give full details).

E. Provide the services of a company specializing in hot taps to perform the Work. Submit to the Architect/Engineer evidence that the company has performed this work for at least 5 years.

F. Approved Manufacturer's:
   1. Topaz, Inc.
   2. Pro Tapping, Inc.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, valves, and connections for piping systems.

B. Condensate Drain.

1.02 RELATED SECTIONS

A. Section 230529 - Pipe Hangers and Supports

B. Section 230555 - Mechanical System Identification

C. Section 230700 - Piping Insulation.

1.03 REFERENCES

A. Section 014500 - Quality Control: Requirements for references and standards.

B. ASTM D1784 - Rigid Vinyl Compounds.

C. ASTM D1785 - PVC Plastic Pipe, Schedule 40

D. ASTM D2466 - PVC Plastic Fittings, Schedule 40

E. ASTM D2665 - PVC Drain, Waste, and Vent Pipe and Fittings

F. ASTM D2564 - Solvent Cements for PVC Pipe and Fittings

G. ASTM D2321 - Underground Installation of Thermoplastic Pipe (non-pressure applications)

H. ASTM F1668 - Procedures for Buried Plastic Pipe

I. ASTM F1866 - Fabricated PVC DWV Fittings

J. NSF Standard 14 - Plastic Piping Components and Related Materials.

K. NSF Standard 61 - Drinking Water System Components - Health Effects.

1.04 SUBMITTALS FOR REVIEW

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:

1. Condensate Drain Piping Product Data Submittal

a. Product Data: Provide data on pipe materials, pipe fittings, and accessories. Provide manufacturers catalog information.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with State of New York and Town code.

B. Identify pipe with marking including size, ASTM material classification and ASTM specification.

1.06 REGULATORY REQUIREMENTS

A. Perform Work in accordance with the State of New York and the Town codes.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Section 016500 – Product Delivery, Storage, and Handling: Transport, handle, store, and protect products.

B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Section 014536 – Environmental Quality Control: Moisture control affecting products on site.

PART 2 - PRODUCTS

2.01 CONDENSATE DRAIN PIPING (DIAMETER LESS THAN OR EQUAL TO 1”)

A. Copper Type L Pipe and Fitting System.

B. Pipe and fittings shall be manufactured from Type L Copper.

C. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer.

D. Pipe and fittings shall conform to National Sanitation Foundation (NSF) Standard 61 or the health effects portion of NSF Standard 14.

E. Testing with or transport/storage of compressed air or gas in Copper pipe or fittings shall not be permitted.

F. The system is intended for pressure drainage applications where the temperature will not exceed 140°F.

2.02 CONDENSATE DRAIN PIPING (DIAMETER GREATER THAN 1")

A. Type L copper solid wall pipe and type L copper fitting system.

B. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer.

C. Pipe and fittings shall conform to National Sanitation Foundation (NSF) Standard 14.

D. Testing with or transport/storage of compressed air or gas in copper pipe or fittings shall not be permitted.

E. The system is intended for non-pressure drainage applications where the temperature will not exceed 140°F.

2.03 PVC SCHEDULE 40 SOLID WALL PIPE AND PVC DWV FITTING SYSTEM.

A. Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a Cell Class of 12454 per ASTM D 1784.

B. PVC Schedule 40 pipe shall be iron pipe size (IPS) conforming to ASTM D1785 and ASTM D2665.

C. Injection molded PVC DWV fittings shall conform to ASTM D2665. Fabricated PVC DWV fittings shall conform to ASTM F1866.

D. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer.

E. Pipe and fittings shall conform to National Sanitation Foundation (NSF) Standard 14.

F. Testing with or transport/storage of compressed air or gas in PVC pipe or fittings shall not be permitted.

G. Buried pipe shall be installed in accordance with ASTM D2321 and ASTM F1668.

H. Solvent cement joints shall be made in a two step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM D2564.

I. Primer shall conform to ASTM F656.

J. The system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with PVC compounds.

K. The system is intended for non-pressure drainage applications where the temperature will not exceed 140°F.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Section 013100 - Project Management and Coordination: Verification of existing conditions before starting work.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and the requirements of the Plumbing Code of New York State.

B. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls. Effect changes in size with reducing fittings.

C. Install piping to maintain headroom, conserve space, and not interfere with use of space.

D. Group piping whenever practical at common elevations.

E. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to fittings. Refer to Section 230700.

F. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 083100 - Access Doors and Panels.

G. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

H. Sleeve pipes passing through partitions, walls and floors.

I. Identify piping under provisions of Section 230555.

3.04 APPLICATION

A. Install unions downstream at equipment or apparatus connections.

3.05 ERECTION TOLERANCES

A. Section 014500 - Quality Control: Tolerances.

B. Establish invert elevations, slopes for drainage to ¼ inch per foot minimum. Maintain gradients.

3.06 FIELD QUALITY CONTROL

A. Drainage System: Test plug all system openings with the exception of the system's highest point. Fill system with water to the point of overflow and subject the highest point to 10-foot head of water. The system shall be considered tight if the pressure is held for not less than 30 minutes without signs of leakage.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section describes the thermometers and pressure gauges for monitoring liquids and gases in mechanical equipment and systems to be provided as part of the Work.

1.02 SUBMITTALS

A. Submit for review, products utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Thermometers and Pressure Gauges Product Data Submittal
      a. Product Data: Submit manufacturer's catalog sheets and specifications.
   2. Accuracy Certifications
      a. Submit certified accuracy for all products specified.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Subject to compliance with the specifications, provide products from the following manufacturers.
   1. Weksler Instruments
   2. H.O. Trerice Co.
   3. Taylor Instrument Co.
   4. Moeller Instrument Co.

2.02 THERMOMETERS FOR MEASURING LIQUID TEMPERATURE

A. Thermometer Scale Ranges: Provide thermometers, with scale range 1-1/2 times the actual working temperature required for the particular application, as approved. Provide maximum of 2 degrees between graduations and 10 degrees between numerals. When scale ranges are in excess of 100 degrees, the maximum range between numerals may be 20 degrees, or as otherwise approved for the particular application.

B. Thermometers: Provide red reading or magnified column industrial type, with wide angle of vision. Thermometers containing mercury are not permitted. Design and materials as follows:
   1. Case: Heavy one piece cast aluminum or extruded brass construction, with a clear acrylic plastic or glass lens. (Adjustable Angle)
   2. Scale: White enamel background with bold black figures and graduations. Provide 7 inch scale length for installation in piping and 9 inch length for installation in tanks and similar equipment.
   3. Separable Thermowell: Provide thermometers with matching brass (for water service) or stainless steel (for steam service) separable socket thermometer wells in accordance with manufacturer’s recommendations.
   4. Stem: Swivel neck design.
   5. Locking Device: Adjustable case locknut and adjusting screw function independently to provide full 360 degree positioning of thermometer case and stem to provide optimal visibility.

2.03 PRESSURE GAUGES

A. Provide pressure gauges with 4½" dial size with a flangeless stainless steel case, stainless steel friction ring and acrylic window. Provide brass movement with a bronze bourdon tube and brass socket.

B. Dial face: white with black figures; pointer with zero adjustment screw.

C. Accuracy: ±1% of scale range, ASME B40.1 Grade 1A.

D. Approved manufacturers: Trerice No. 620 or approved equal.

E. Provide stainless steel needle valves for all pressure gauges, Trerice or approved equal.

F. Provide pressure snubbers for gauges on any service where pressure surges or pulsations are possible, Trerice No. 872 or approved equal.

2.04 COMBINATION PRESSURE/TEMPERATURE TEST STATIONS

A. Provide test stations where shown on the Drawings.

B. Test stations: “Pete’s Plug II”, 1/4” solid brass fitting to receive either a 1/8” OD temperature or pressure probe with two valve cores of Neoprene (Max 200°F at 500 PSI), or Nordel (Max 275°F at 500 PSI). Provide fitting with a color coded cap strap with gasket, rated at 1000 PSI at 140°F. Provide material compatible with piping system that test station is installed in as per manufacturer’s recommendations.

C. When installed in insulated lines, test connection provide Pete’s XL plug, extended stem type.

D. Supply to the Owner, upon completion of the Work, a pressure and temperature test kit consisting of a 0-100 PSI, 0-230 ft. of water pressure gauge with a Number 500 gauge adapter attached,. one 25-125°F and one 0-220°F pocket testing thermometer, an extra number 500 gauge adapter, and a protective carrying case.

E. Approved Manufacturer: - Pete’s Plug II by Peterson Equipment.

2.05 RANGES FOR TEMPERATURE AND PRESSURE GAUGES

Thermometer	Hot Water	60° to 240°F
Pressure Gauges	Hot Water	0 to 60 psig
Thermometer	Chilled Water	30° to 100°F
Pressure Gauges	Chilled Water	0 to 60 psig
Thermometer	Steam/Condensate	60° to 260°F
Pressure Gauges	Steam/Condensate	0 to 60 psig

Note: Select the proper range so that the average operating pressure and temperature falls approximately in the middle of the scale selected. It is the Contractor’s responsibility to determine the average operating range and select the scale appropriately, using the above table as an approximate guide.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Thermometers:
   1. Install thermometers, of type and scale range as required for the particular application, at locations indicated on the Drawings or as required by the Specifications.
   2. Install thermometers of type, scale range, and with case style, as required for the particular application, at locations indicated on the Drawings or Specified. Angle each thermometer so that it can be easily read from a standing position at floor level.
   3. Where thermometers are installed in piping with insulation 2 inches thick or greater, provide thermometer wells with extension necks. Omit extension necks where thermometers are used on bare pipe or pipe with insulation less than 2 inches thick.
   4. Where thermometer wells are installed in piping 2 ½ inches and smaller, increase the pipe size by a minimum of one pipe diameter to avoid restricting the flow in the pipe or install thermometers at elbows such that the stems protrude into the flowing medium.

B. Pressure Gauges:
   1. Install gages, of type and scale range as required for the particular application, at locations indicated on the Drawings or as required by the Specifications.
   2. For measuring liquid pressure, install gauges complete with stop cocks and drain cocks.

C. Pressure Snubbers and Impulse Dampers:
   1. Install "pressure snubbers" in the piping connections to all gages installed in the suction and discharge piping connections to close coupled and base mounted circulating pumps driven by motors under 10 HP.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section describes the pipe specialties for piping systems including, but not limited, to the following:
   1. Drain Valves
   2. Strainers
   3. Air Vents
   4. Escutcheons
   5. Flexible Rubber Connectors
   6. Flexible Stainless Steel Hoses
   7. Dielectric Connections

1.02 REFERENCES

A. ASME - Boilers and Pressure Vessel Codes, SEC 8-D-Rules for Construction of Pressure Vessels.

1.03 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Piping Specialties Product Data Submittal
      a. Product Data: Submit product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes and finishes. Include produce description, model and dimensions.
      b. Submit manufacturer's instructions for maintenance and repair.
      c. Submit a valve and specialty application schedule.

1.04 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include installation instructions, assembly views, lubrication instructions and replacement parts list.

1.05 RELATED WORK

A. Section 232000 - Pipe, Valves and Fittings

1.06 QUALIFICATIONS

A. Companies specializing in making products specified with at least 5 years of experience and products that have been on the market for at least 3 years.

PART 2 - PRODUCTS

2.01 DRAIN VALVE

A. Provide drain valves, ball type with ¾ inch hose connector, at all low points of water systems, on strainers, and in all locations as shown on the Drawings. Provide minimum 3/4 inch drain size. Provide caps or plugs with chain at all drain and fill valves.

2.02 STRAINERS

A. General:
   1. Provide strainers ahead of all pumps, automatic control valves, as specified for piping installations, as shown on the Drawings, and as required for proper functioning of equipment.

B. Fuel Oil Strainers
   1. Cast iron body, with threaded connections, sized as shown on the Drawings and suitable for working pressures to 200 psig. Clamped cover and handle for removal of the basket. Basket constructed of 40 mesh stainless steel.
   2. Approved Manufacturer: Preferred Utilities Mfg. Corp. Model 72.

C. Steam and Water Strainers
   1. “Y” type or “Basket” type, as shown on the Drawings.

2. Provide a strainer screen blow down valve the full size of the blow-off tapping for each strainer. Provide gate valves for steam service and ball valve with ½ inch hose end for water service.
3. Stainless steel strainer screens with perforations as follows:

PIPE SIZE (INCHES)	WATER SERVICE PERFORATIONS (INCHES)	STEAM SERVICE PERFORATIONS (INCHES)
THRU 4	1/16 (EXCEPT AT COOLING TOWER PUMPS SHALL BE 1/8)	1/32
OVER 4	1/8	3/64

A. Select the length of the nipple connecting the blow-off valve to the strainer basket flange so that the blow-off valve is clear of the insulation.

B. Select strainers with bodies compatible with connected piping from the following schedule for the service intended.

SIZE	MANUFACTURER	STRAINER TYPE	MODEL NO.	DESCRIPTION
2 INCHES & SMALLER	MUELLER STEAM SPECIALTY	Y	11M	CAST IRON BODY, THREADED ENDS, ANSI CLASS 250
2 INCHES & SMALLER	MUELLER STEAM SPECIALTY	Y	358S	BRONZE BODY, SOLDERED ENDS, ANSI CLASS 125, FOR COPPER PIPE
2 ½ INCHES & LARGER	MUELLER STEAM SPECIALTY	Y	758	CAST IRON BODY, FLANGED ENDS, ANSI CLASS 125
2 INCHES & SMALLER	MUELLER STEAM SPECIALTY	BASKET	125	CAST IRON BODY, SCREWED ENDS, ANSI CLASS 125
2 INCHES & SMALLER	MUELLER STEAM SPECIALTY	BASKET	125B	BRONZE BODY, SCREWED ENDS, ANSI CLASS 150, FOR COPPER PIPE
2 ½ INCHES & LARGER	MUELLER STEAM SPECIALTY	BASKET	166	CAST IRON BODY, FLANGED ENDS, ANSI CLASS 250

A. Magnetic Strainers
1. Shall be provided upstream of all pumps or other devices in contact with hydronic fluid that can impart a magnetic field (temporary or permanent) resulting in build-up or concentration of stray ferrous materials within the fluid stream.
2. Strainers shall be line size or larger.
3. Strainers shall be sized as required to protect downstream equipment.
4. In Line 'Y" configuration
5. Class 125 flanged body (2"-12") with stainless steel screen, removable drywell, neodymium magnet, blow down ball valve.

6. Approved Manufacturer: Metraflex LPD-MAG

2.03 AIR VENTS

A. Automatic Air Vents:
   1. Float actuated high capacity air vent designed to purge free air from the system and provide shutoff at pressures up to 150 psig at a maximum temperature of 250 degrees F. Design to prevent air from entering the system if system pressure drops below atmospheric pressure and to purge free air at pressures up to 150 psig during normal system operation.
   2. Cast iron and fitted with components of stainless steel, brass, and EPDM.
   3. Provide a shutoff ball valve before the automatic air to isolate the air vent from the system.
   4. Approved Manufacturer: ITT Bell & Gossett Model 107A.

B. Manual Air Vents:
   1. ½ inch ball valves with ½ inch hose ends.

2.04 ESCUTCHEONS

A. Provide escutcheons with spring-catch fasteners at all locations where insulated or uninsulated piping, installed exposed to view, penetrates wall, partitions, floors, and ceilings.

B. Plain pattern, chrome-plated brass for all piping except galvanized steel.

C. Galvanized around galvanized steel pipe.

D. Deep recess to cover sleeves at floor penetrations.

2.05 FLEXIBLE RUBBER CONNECTORS

A. Flexible spherical expansion joints with peroxide cured EPDM in the covers, liners and Kevlar tire cord frictioning.

B. Solid steel rings within the raised face rubber flanged ends to prevent pullout. Flexible cable bead wire is not acceptable.

C. Sizes ¾” to 1 ½”: threaded two piece bolted flange assemblies, one sphere and cable retention

D. Sizes 2" and larger: two spheres reinforced with a ductile iron external ring between spheres. Split ductile iron or steel flanges with hooked or similar interlocks.

E. Sizes 16" to 24": Single sphere.

F. Connectors up to 14” rated at 250 psi up to 170 degrees F with a uniform drop in allowable pressure to 215 psi at 250 degrees F.

G. Connectors 16" through 24": single sphere minimum ratings 180 psi at 170 degrees F and 150 psi at 250 degrees F.

H. Safety factors to burst and flange pullout: minimum of 3/1.

I. Factory test all expansion joints to 150% of rated pressure for 12 minutes before shipment.

J. Concentric reducers conforming to the above ratings may be substituted for equal ended expansion joints.

K. Use control rods only in unanchored piping locations where the manufacturer determines the installation exceeds the pressure requirement without control rods.
   1. Control rods: ½” thick Neoprene washer bushings large enough in diameter to take the thrust at 1000 psi maximum on the washer area.

L. Submit two test reports by independent consultants showing minimum reductions of 20 DB in vibration accelerations and 10 DB in sound pressure levels at typical blade passage frequencies on this or a similar product by the same manufacturer. Install expansion joints on the equipment side of shut off valves.

M. Approved Manufacturer:
   1. Type SAFEFLEX SFDEJ, SFEJ, SFDCR or SFU and Control Rods CR as manufactured by Mason Industries, Inc.

2.06 FLEXIBLE STAINLESS STEEL HOSE

A. Stainless steel braid and carbon steel fittings.

B. End connections: Sizes 2 ½ “and smaller, threaded male nipples. Sizes 3" and larger, flanged.

C. Minimum lengths as tabulated below:

SIZE (INCHES)	MINIMUM SIZE (INCHES)	SIZE (INCHES)	MINIMUM LENGTH (INCHES)
1/2	9	4	15
3/4	10	6	20
1	11	8	22
1 1/4	12	10	26
1 1/2	13	12	28
2	14	14	30
2 1/2	18	16	32
3	14		

A. Approved Manufacturer: Type BSS as manufactured by Mason Industries, Inc.

2.07 DIELECTRIC CONNECTIONS

A. Approved Manufacturer: Watts Regulator Series 3000 Dielectric Unions and Flange Systems

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

A. Install work in accordance with manufacturer’s instructions and as shown on the Drawings.

B. Furnish and connect to all valves, brass tags, polished or lacquered, with stamp lettering or numbers filled in with black paint. Identify each zone.

C. See “Pipe, Valve and Fitting” Specification for more information.

D. Secure escutcheons to the pipe or insulation and flush with the building surface.

E. Clean the valves and place them in final operating position

3.02 STRAINER INSTALLATION

A. Installed strainers so they are readily accessible

B. Remove start-up strainer screen from suction diffusers and strainers and install permanent screens prior to balancing water systems.

3.03 FLEXIBLE CONNECTOR INSTALLATION

A. Install flexible Connectors at all locations where piping connects to cooling towers, chillers, air handlers, pumps, or compressors and other places shown on the Drawings.

B. Install Flexible Rubber Connectors only in equipment rooms. Where flexible connectors are required in ceilings or other construction away from equipment rooms and when temperatures exceed 250 degrees F, install Flexible Stainless Steel Hoses.

C. Where Flexible Rubber Connectors can not be installed due to temperature and pressure limitations install Flexible Stainless Steel Hoses.

D. Install connectors the equipment side of the shut-off valves horizontally and parallel to the equipment shafts wherever possible.

E. Install expansion joints in piping gaps equal to the length of the expansion joints under pressure.

3.04 AIR VENT INSTALLATION

A. Provide automatic air vents with ¼ inch copper drip lines to the nearest floor or roof drain.

B. Install air vents where shown on the Drawings and at the high points of all systems and at other locations as required to allow complete venting of air from the system.

3.05 DIELECTRIC CONNECTIONS

A. Isolate connections between dissimilar metallic materials. Use dielectric unions or flanges that provide a complete isolation of the two ends, including bolts for flanges, using materials suitable for the design pressure, temperature and fluid contained.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of the following Division 23 Sections apply to this section:
   1. Section 230010 - General Mechanical Requirements.
   2. Section 230529 - Pipe Hangers And Supports
   3. Section 230555 - Mechanical System Identification
   4. Section 230700 - Pipe Insulation

1.02 SUMMARY

A. This Section includes refrigerant piping used for air conditioning applications. This Section includes:
   1. Piping, tubing, fittings, and specialties.
   2. Special duty valves.
   3. Refrigerants.

B. Products installed but not furnished under this Section include pre-charged tubing, refrigerant specialties, and refrigerant accessories furnished as an integral part of or separately with packaged air conditioning equipment.

1.03 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Refrigerant Piping Product Data Submittal
      a. Product data for the following products:
         1) Each type of valve specified.
         2) Each type of refrigerant piping specialty specified.
      b. Maintenance data for refrigerant valves and piping specialties, for inclusion in Operating and Maintenance Manual specified in Division 01 and Division 23.
   2. Refrigerant Piping Shop Drawings
      a. Shop Drawings showing layout of refrigerant piping, specialties, and fittings including, but not necessarily limited to, pipe and tube sizes, valve arrangements and locations, slopes of horizontal runs, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and proximity to equipment.
   3. Brazer's Certifications
      a. Brazer's Certificates signed by Contractor certifying that brazers comply with requirements specified under "Quality Assurance" below.

1.04 QUALITY ASSURANCE

A. Qualify brazing processes and brazing operators in accordance with ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications".

B. Regulatory Requirements: Comply with provisions of the following codes:
   1. ANSI B31.5: ASME Code for Pressure Piping - Refrigerant Piping.
   2. ANSI/ASHRAE Standard 15: Safety Code for Mechanical Refrigeration.

C. Mechanical Code of New York State

1.05 SEQUENCING AND SCHEDULING

A. Coordinate the installation of roof piping supports, and roof penetrations.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

B. Refrigerant Valves and Specialties:
   1. Alco Controls Div, Emerson Electric
   2. Danfoss Electronics, Inc
   3. EATON Corporation, Control Div
   4. Henry Valve Company
   5. Parker-Hannifin Corporation, Refrigeration and Air Conditioning Division
   6. Sporlan Valve Company

2.02 PIPE AND TUBING MATERIALS

A. General: Refer to Part 3, Article "PIPE APPLICATIONS" for identification of systems where the below specified pipe and fitting materials are used.

B. Copper Tubing: ASTM B 280, Type ACR, hard-drawn straight lengths, and soft-annealed coils, seamless copper tubing. Tubing shall be factory cleaned, ready for installation, and have ends capped to protect cleanliness of pipe interiors prior to shipping.

C. Copper Tubing: ASTM B 88, Type L, hard-drawn straight lengths, and soft-annealed coils, seamless copper tubing.

2.03 FITTINGS

A. Wrought-Copper Fittings: ANSI B16.22, streamlined pattern for hard drawn and soft copper.

2.04 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8, Classification BAg-1 (Silver)

2.05 VALVES

A. General: Complete valve assembly shall be UL-listed and designed to conform to ARI 760.

B. Globe: 450 psig maximum operating pressure, 275 deg. F maximum operating temperature; cast bronze body, with cast bronze or forged brass wing cap and bolted bonnet; replaceable resilient seat disc; plated steel stem. Valve shall be capable of being repacked under pressure. Valve shall be straight through or angle pattern, with solder-end connections.

C. Check Valves - Smaller Than 7/8 inch: 500 psig maximum operating pressure, 300 deg. F maximum operating temperature; cast brass body, with removable piston, Teflon seat, and stainless steel spring; straight through globe design. Valve shall be straight through pattern, with solder-end connections.

D. Check Valves - 7/8 inch and Larger: 450 psig maximum operating pressure, 300 deg. F maximum operating temperature; cast bronze body, with cast bronze or forged brass bolted bonnet; floating piston with mechanically retained Teflon seat disc. Valve shall be straight through or angle pattern, with solder-end connections.

E. Solenoid Valves: 250 deg. F temperature rating, 400 psig working pressure; forged brass, with Teflon valve seat, two-way straight through pattern, and solder end connections. Provide manual operator to open valve. Furnish complete with NEMA 1 solenoid enclosure with 1/2 inch conduit adapter, and 24 volt, 60 Hz. normally closed holding coil.

F. Hot Gas Bypass Valve: adjustable type, sized to provide capacity reduction beyond the last step of compressor unloading; and wrought copper fittings for solder end connections.

2.06 REFRIGERANT PIPING SPECIALTIES

A. General: Complete refrigerant piping specialty assembly shall be UL-listed and designed to conform to ARI 760.

B. Strainers: 500 psig maximum working pressure; forged brass body with monel 80-mesh screen, and screwed cleanout plug; Y-pattern, with solder end connections.

C. Moisture/liquid Indicators: 500 psig maximum operation pressure, 200 deg. F maximum operating temperature; forged brass body, with replaceable polished optical viewing window, and solder end connections.

D. Filter-driers: 500 psig maximum operation pressure; steel shell, flange ring, and spring, ductile iron cover plate with steel capscrews, and wrought copper fittings for solder end connections. Furnish complete with replaceable filter-drier core kit, including gaskets. Standard capacity desiccant sieves to provide micronic filtration.

E. Flanged Unions: 400 psig maximum working pressure, 330 deg. F maximum operating temperature; two brass tailpiece adapters for solder end connections to copper tubing; flanges for 7/8 inch through 1-5/8 inch unions shall be forged steel, and for 2-1/8 inch through 3-1/8 inch shall be ductile iron; four plated steel bolts, with silicon bronze nuts and fiber gasket. Flanges and bolts shall have factory-applied rust-resistant coating.

F. Flexible Connectors: 500 psig maximum operating pressure; seamless tin bronze or stainless steel core, high tensile bronze braid covering, solder connections, and synthetic covering; dehydrated, pressure tested, minimum 7 inch in length.

2.07 REFRIGERANTS

A. Refrigerant No. 454B, in accordance with ASHRAE Standard 34.

B. Refrigerant No. 32, in accordance with ASHRAE Standard 34.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine rough-in for refrigerant piping systems to verify actual locations of piping connections prior to installation.

3.02 PIPE APPLICATIONS

A. Use Type L, or Type ACR drawn copper tubing with wrought copper fittings and brazed joints above ground, within building. Use Type K, annealed temper copper tubing for 2 inch and smaller without joints, below ground and within slabs. Mechanical fittings (crimp or flair) are not permitted.

B. Install annealed temper tubing in pipe duct. Vent pipe duct to the outside.

C. If other than Type ACR tubing is used, clean and protect inside of tubing as specified in Article "CLEANING" below.

3.03 PIPING INSTALLATIONS

A. General: Install refrigerant piping in accordance with ASHRAE Standard 15 - "The Safety Code for Mechanical Refrigeration."

B. Install piping in as short and direct arrangement as possible to minimize pressure drop.

C. Install piping for minimum number of joints using as few elbows and other fitting as possible.

D. Arrange piping to allow normal inspection and servicing of compressor and other equipment. Install valves and specialties in accessible locations to allow for servicing and inspection.

E. Provide adequate clearance between pipe and adjacent walls and hanger, or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full thickness insulation.

F. Insulate suction lines. Liquid line are not required to be insulated, except where they are installed adjacent and clamped to suction lines, where both liquid and suction lines shall be insulated as a unit.

G. Do not install insulation until system testing has been completed and all leaks have been eliminated.

H. Install branch tie-in lines to parallel compressors equal length, and pipe identically and symmetrically.

I. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.

J. Slope refrigerant piping as follows:
   1. Install horizontal hot gas discharge piping with 1/2" per 10 feet downward slope away from the compressor.
   2. Install horizontal suction lines with 1/2 inch per 10 feet downward slope to the compressor, with no long traps or dead ends which may cause oil to separate from the suction gas and return to the compressor in damaging slugs.
   3. Liquid lines may be installed level.

K. Install traps and double risers where indicated, and where required to entrain oil in vertical runs.

L. Use fittings for all changes in direction and all branch connections.

M. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

N. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

O. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

P. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1 inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

Q. Locate groups of pipe parallel to each other, spaced to permit applying insulation and servicing of valves.

R. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6 inch shall be steel; pipe sleeves 6 inch and larger shall be sheet metal.

S. Fire Barrier Penetrations: Where pipes pass through fire rated walls, partitions, ceilings, and floors, maintain the fire rated integrity. Refer to Division 7 for special sealers and materials.

T. Make reductions in pipe sizes using eccentric reducer fittings installed with the level side down.

U. Install strainers immediately ahead of each expansion valve, solenoid valve, hot gas bypass valve, compressor suction valve, and as required to protect refrigerant piping system components.

V. Install moisture/liquid indicators in liquid lines between filter/driers and thermostatic expansion valves and in liquid line to receiver.

W. Install moisture/liquid indicators in lines larger than 2-1/8 inch OD, using a bypass line.

X. Install unions to allow removal of solenoid valves, pressure regulating valves, expansion valves, and at connections to compressors and evaporators.

Y. Install flexible connectors at the inlet and discharge connection of compressors.

3.04 HANGERS AND SUPPORTS

A. General: Hanger, supports, and anchors are specified in Division 23 Section "PIPE HANGERS AND SUPPORTS." Conform to the table below for maximum spacing of supports:

B. Install the following pipe attachments:
   1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet in length.

C. Support horizontal copper tubing in accordance with MSS SP-69 Tables 3 and 4, excerpts of which follow below:

NOMINAL PIPE SIZE (Inches)	ROD DIAMETER (Inches)	MAXIMUM SPACING (Feet)
1/2 to 3/4	3/8	5

1	3/8	6
1-1/4	3/8	6
1-1/2	3/8	8
2	3/8	8

D. Support vertical runs at each floor.

3.05 PIPE JOINT CONSTRUCTION

A. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."

B. WARNING: Some filler metals contain compounds which produce highly toxic fumes when heated. Avoid breathing fumes. Provide adequate ventilation.

C. CAUTION: When solenoid valves are being installed, remove the coil to prevent damage. When sight glasses are being installed, remove the glass. Remove stems, seats, and packing of valves, and accessible internal parts of refrigerant specialties before brazing. Do no apply heat near the bulb of the expansion valve.

D. Fill the pipe and fittings during brazing, with an inert gas (i.e., nitrogen or carbon dioxide) to prevent formation of scale.

E. Heat joints using oxy-acetylene torch. Heat to proper and uniform brazing temperature.

3.06 VALVE INSTALLATIONS

A. General: Install refrigerant valves where indicated, and in accordance with manufacturer's instructions.

B. Install globe valves on each side of strainers and driers, in liquid and suction lines at evaporators, and elsewhere as indicated.

C. Install a full sized, 3-valve bypass around each drier.

D. Install solenoid valves ahead of each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at the top.

E. Electrical wiring for solenoid valves is specified in Division 26. Coordinate electrical requirements and connections.

F. Thermostatic expansion valves may be mounted in any position, as close as possible to the evaporator.

G. Where refrigerant distributors are used, mount the distributor directly on the expansion valve outlet.

H. Install the valve in such a location so that the diaphragm case is warmer than the bulb.

I. Secure the bulb to a clean, straight, horizontal section of the suction line using two bulb straps. Do not mount bulb in a trap or at the bottom of the line.

J. Where external equalizer lines are required make the connection where it will clearly reflect the pressure existing in the suction line at the bulb location.

K. Install pressure regulating and relieving valves as required by ASHRAE Standard 15.

3.07 EQUIPMENT CONNECTIONS

A. The Drawings indicate the general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow servicing and maintenance.

3.08 FIELD QUALITY CONTROL

A. Inspect, test, and perform corrective action of refrigerant piping in accordance with ASME Code B31.5, Chapter VI.

B. Repair leaking joints using new materials, and retest for leaks.

3.09 CLEANING

A. Before installation of copper tubing other than Type ACR tubing, clean the tubing and fitting using following cleaning procedure:
   1. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through the tubing by means of a wire or an electrician's tape.
   2. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
   3. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
   4. Finally, draw a clean, dry, lintless cloth through the tube or pipe.

3.10 ADJUSTING AND CLEANING

A. Verify actual evaporator applications and operating conditions, and adjust thermostatic expansion valve to obtain proper evaporator superheat requirements.

B. Clean and inspect refrigerant piping systems in accordance with requirements of Division-23 General Mechanical Requirements

C. Adjust controls and safeties. Replace damaged or malfunctioning controls and equipment with new materials and products.

3.11 COMMISSIONING

A. Charge system using the following procedure:
   1. Install core in filter dryer after leak test but before evacuation.
   2. Evacuate refrigerant system with vacuum pump; until temperature of 35 deg F is indicated on vacuum dehydration indicator.
   3. During evacuation, apply heat to pockets, elbows, and low spots in piping.
   4. Maintain vacuum on system for minimum of 5 hours after closing valve between vacuum pump and system.
   5. Break vacuum with refrigerant gas, allow pressure to build up to 2 psi.
   6. Complete charging of system, using new filter dryer core in charging line. Provide full operating charge.
   7. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance of refrigerant piping valves and refrigerant piping specialties.

B. Review data in Operating and Maintenance Manuals. Refer to Division 01 section "Project Closeout."

C. Schedule training with Owner with at least 7 days advance notice.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the galvanized steel, flexible, and aluminum ductwork for HVAC duct systems in accordance with SMACNA Duct Construction Standards, except as otherwise specified.

B. The construction material for each ductwork system shall be as listed in the “Ductwork Material Schedule” at the end of this Section.

C. This Section also describes the fittings, access doors, hangers and supports, manual volume dampers and sealants for each ductwork system as required.

1.02 RELATED WORK

A. Section 230594 - Balancing of Air Systems

1.03 REFERENCES

A. ASHRAE - Handbook Fundamentals; Latest Edition.

B. SMACNA - HVAC Duct Construction Standards Metal And Flexible (latest issue)

C. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

D. ASTM B209 - Specifications for Aluminum and Aluminum-Alloy Sheet and Plate.

E. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

F. UL 555 S - Fire Dampers & Smoke Dampers.

G. NFPA 96 - Standard for Commercial Cooking Operations

H. New York State Mechanical Code.

1.04 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A, SMACNA, and New York State Mechanical Code standards.

1.05 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:

1. Ductwork Shop Drawings
    a. Coordinate layout duct drawings that differ from ductwork shown on the Drawings.
    b. The review of deviations will be for pressure drop only. The review will not address clearances or accessibility to maintain or balance the air systems. No dimensional or coordination check of the shop drawings will be made. The Contractor has the sole responsibility to review the Drawings, coordinate ductwork fabrication, and provide clearances and access for installation, maintenance and balancing of this work, and work of other trades. Unless specifically dimensioned, Drawings indicate approximate locations only. The Contractor has the sole responsibility to locate and route the ductwork.
    c. Deviations such as changing direction or transforming or dividing ductwork must maintain ductwork cross-sectional area and not exceed transformation taper of 15 degrees.
    d. Plans and section showing all equipment and accessories.
    e. Minimum 3/8 in. scale, double line, showing sizes, transverse joints, transitions, elevations, clearances and accessories; sections where required.
    f. Coordinate rooftop unit supply and return air duct openings with custom roof curb (return air plenum curb with field cut return air opening at roof level/bottom of roof curb) and existing steel trusses.
2. Sheet Metal Product Data Submittal
    a. Submit product data for materials and equipment listed within Part 2 of this specification.

1.06 QUALITY ASSURANCE

A. Construct all ductwork in accordance with referenced SMACNA Standards, except as otherwise stated. Ductwork pressure classifications shall be in accordance with referenced SMACNA Standards, except as otherwise specified.

B. For all uninsulated ductwork casings and plenums located outdoors, the reinforcement members shall be galvanized steel or stainless steel.

C. Construction pressure classification of ductwork are shown on the Drawings. If not shown, the pressure classification shall be greater than or equal to the maximum operating static pressure (minimum 2" w.c. pressure classification).

D. All ductwork shall be free from pulsation, chatter, vibration and objectionable noise. If any of these defects appear after a system is in operation, correct by removing and replacing, or reinforcing the ductwork, at no additional cost to the Owner.

E. For all galvanized steel ductwork, zinc coating shall be minimum G90 per ASTM A653.

PART 2 - PRODUCTS

2.01 GALVANIZED STEEL RECTANGULAR DUCTS AND FITTINGS

A. Construct ducts of galvanized sheet steel meeting ASTM A 653 with G90 coating designation, and in accordance with the latest SMACNA HVAC Duct Construction Standards Metal And Flexible and pressure classifications as stated on the Drawings (minimum 2" w.c. pressure classification).

B. No ducts shall be less than No. 22 U.S. Gauge.

C. Piping, conduit and structure shall not penetrate ductwork. Where this condition cannot be avoided and with the written permission of the Architect/Engineer, follow SMACNA HVAC Duct Construction Standards Metal and Flexible, except that sides of transition sections shall slope a maximum of 15 degrees.

D. Provide 90-degree full-radius elbows with a centerline radius 1.5 times the duct width in the plane of the bend.

E. For elbows with centerline radius less than 1.5 times the width of the duct in the plane of the bend, provide turning vanes.

F. Provide square throat elbows with manufactured turning vanes.

G. All dissimilar metals shall be connected with flanged joints made up with fiber or neoprene gaskets to prevent contact between dissimilar metals. Flanges shall be fastened with bolts protected by ferrules and washers made of the same materials as the gaskets.

H. For split fittings, the split shall be proportional to the air flow. Construct per SMACNA HVAC Duct Construction Standards- Metal and Flexible.

I. Transitions and Offsets shall follow SMACNA HVAC Duct Construction Standards Metal and Flexible, except that sides of transitions shall slope a maximum of 15 degrees.

J. All branch take-offs perpendicular to the main shall be a 45 degree entry.

K. Longitudinal seams shall be of the Pittsburgh Lock type outlined in the SMACNA HVAC Duct Construction Standards Metal and Flexible.

L. Duct transverse joints shall be selected and used consistent with the static pressure class, applicable sealing requirements, materials involved, duct support intervals and other provisions for proper assembly of ductwork outlined in the SMACNA HVAC Duct Construction Standards - Metal and Flexible. Transverse joints T-25a, T-25b (Ductmate) shall only be used. Metal clips will only be allowed (NO PVC). Ductmate shall not be used for the following (use transverse joints T-15 through T-24 in these cases):

1. The Ductmate '45' system shall not be used for applications with duct gauges heavier than 10 or lighter than 22.
2. The Ductmate '35' system shall not be used for applications with duct gauges heavier than 16 GA. or lighter than 26 GA.

3. The Ductmate '25' system shall not be used for application with duct gauges heavier than 20 GA. or lighter than 26 GA.

2.02 TURNING VANES

A. Manufactured with same material as ductwork that it is installed in and to the same pressure classification as ductwork that they are installed in.

B. Provide turning vanes in all square duct elbows and as noted on the Drawings.

C. Vanes shall be as detailed in SMACNA HVAC Duct Construction Standards Metal and Flexible.
   1. Single thickness 2" or 4" vanes up to 36" length.
   2. Double wall 2" vanes up to 48" length.
   3. Double wall 4" vanes up to 72" length.

D. Where a rectangular duct changes in size at a square-throat elbow fitting, use single thickness turning vanes with trailing edge extensions aligned with the sides of the duct.

2.03 ACCESS DOORS

A. For access doors for use in ductwork receiving Fire Rated Blanket Insulation see Ductwork Insulation Section for requirements. Fabricate all other access doors in accordance with SMACNA Duct Construction Standards Metal And Flexible and as indicated.

B. For HVAC duct systems, construct doors of the same material as the ductwork. Minimum size of access doors shall be 8 inches by 8 inches, unless shown otherwise.

C. Provide walkthrough doors where shown. These doors shall have a minimum clear width of 18 inches. Provide doors with 8 inch square double pane wire glass windows. Locate windows not to exceed 5 feet-6 inches to centerline above finished floor of installed casing. Walk-through doors shall be operable from both sides of the door.

D. Access doors shall be insulated same as duct.

E. Provide with continuous neoprene gaskets around perimeter of access doors for airtight seal.

F. Provide all access doors with cam lock latches.

G. Provide access doors with watertight gaskets in shower room exhaust ductwork. Doors shall be of extra-heavy stainless construction.

H. All access doors serving a fire damper shall be painted red and shall have a label with white letters not less than ½ inch high reading “FIRE DAMPER”. No external ductwork insulation shall conceal a fire damper access door unless there is a label attached to the insulation indicating the exact location of the access door.

I. Provide access doors in following locations:
   1. Heaters and coils in ducts: entering and leaving side.
   2. Automatic dampers: linkage side.
   3. Fire damper, on both sides of ducts.
   4. Smoke detection heads.
   5. On both sides of ducts where necessary to provide maintenance accessibility to equipment on either side.
   6. VAV boxes
   7. Heating and Cooling coils.
   8. Fan Plenums.
   9. In-Line Fans (suction and discharge sides)
   10. Other items requiring access for service/maintenance

J. Where duct access doors are concealed the Contractor shall furnish and pay for installation of access doors to be mounted in the fire rated walls and ductwork enclosures. The access doors must be fire resistive and minimum 6” larger on each side then the duct access door for the above mentioned applications.

2.04 MANUAL VOLUME DAMPER

A. Fabricate in accordance with SMACNA Duct Construction Standards Metal And Flexible, and as indicated.

B. Fabricate single blade dampers for duct sizes up to 12 inches in height.

C. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes of 4 inches for ducts above 6 inches in height. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

D. Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

E. Provide locking, indicating quadrant regulators on single and multi-blade dampers.

F. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

G. Volume damper shall be provided at each duct branch and also where shown on the Drawings. Volume dampers must be installed at each branch even if they are not shown on the Drawing.

H. Approved Manufacturers:
   1. Ruskin Mfr. Co.
   2. Arrow Damper & Louver.
   3. Imperial Damper Co.

2.05 BACKDRAFT DAMPERS

A. Dampers shall be low-leakage, parallel-blade type. Damper sizes shall be suitable for duct sizes noted on the Drawings. The dampers shall be suitable for a minimum 4000 fpm velocity.

B. Damper frames shall be minimum No. 12 gauge galvanized steel blades shall be minimum No. 16 gauge galvanized steel or Type 6063-T5 aluminum with press-fit ball bearings.

C. Dampers shall be complete with adjustable counterweights and linkage for duty at .20 inches w.g. and 3500 fpm.

D. Provide neoprene or silicone rubber blade seals.

E. Approved manufacturers - Ruskin Manufacturing Company.

2.06 DUCT TEST HOLES

A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.07 DUCT HANGERS AND SUPPORTS

A. Provide trapeze, strap or angle iron hangers meeting SMACNA HVAC Duct Construction Standards Metal and Flexible.

B. Materials of hangers, supports and fasteners shall conform to the manufacturer’s load ratings.

C. Hangers, supports, upper attachments and inserts shall be hot-dip galvanized steel or stainless steel.

D. Fasteners for HVAC duct systems shall be hot-dip galvanized steel, cadmium-plated steel or stainless steel.

E. Secure ductwork hangers attached to concrete structures and slabs with embedded inserts, anchor bolts or concrete fasteners. A safety factor of 5 should be used in selection of all inserts and expansion bolts (if applicable safety factor shall be determined by analysis of seismic loads and the greater safety factor shall be used).

F. Provide hangers and supports not more than 12 inches from each face of a horizontal elbow.

G. Plenums shall be supported to permit personnel to enter the plenum. If no structural steel design is shown on the Drawings, it is the responsibility of the Contractor to provide the services of a

licensed structural engineer in the in which the project is to be constructed to submit a structural design for review.

2.08 SEALANTS

A. Where ducts are not continuously welded or soldered, provide sealants and gaskets as required to meet the specified duct leakage allowance.

B. Provide Gaskets, Sealers, Mastics and Tapes as manufactured by Ductmate.

2.09 FIRE DAMPERS

A. Fabricate and install in accordance with NFPA 90A and UL Safety Standard 555, and AMCA Standard 500.

B. Fire Resistance: For penetrations through construction rated less than 3 hours, 1 ½ hours. For penetrations through construction rated for 3 hours or more, 3 hours.

C. Pressure Differential Rating: 4 in. w. g.

D. Velocity Rating: 2000 fpm

E. Fabricate curtain type dampers of galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades in air stream. Fabricate fire dampers for vertical and horizontal position.

F. Fabricate multiple blade fire dampers with 16 gauge galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

G. Fusible links, UL 33, shall separate at 165 degrees F.

H. Acceptable Manufacturers:
   1. Greenheck Model DFD 150, 200 and 350
   2. Ruskin Mfr. Co.
   3. Arrow Damper & Louver.
   4. Imperial Damper Co.

2.10 SMOKE DAMPERS

A. Fabricate and install in accordance with NFPA 90A and UL Safety Standard 555S, and AMCA Standard 500.

B. Leakage Class: Leakage Class II per UL 555S

C. Pressure Differential Rating: 4 In. w. g.

D. Air Flow Velocity: 2000 fpm

E. Elevated Temperature Rating: 350 Deg. F per UL555S

F. Fabricate smoke dampers with 16 gage galvanized steel frame and blades, sintered bronze sleeve type bearings rotating in polished extruded holes in the damper frame, 1/2 inch diameter (minimum) plated steel axles, linkage concealed in the jamb, stainless steel blade stops, silicone rubber blade edge seals, and stainless steel compression type jamb seals.

G. Actuators: 24 VDC, 2-position, external mounting

H. Acceptable Manufacturers:
   1. Greenheck Model SMD-200 and SMD-300.
   2. Ruskin Mfr. Co.
   3. Arrow Damper & Louver.
   4. Imperial Damper Co.

2.11 COMBINATION FIRE SMOKE DAMPERS

A. Fabricate and install in accordance with NFPA 90A and UL Safety Standards 555 & 555S, and AMCA Standard 500.

B. Fire Resistance: For penetrations through construction rated less than 3 hours, 1 ½ hours. For penetrations through construction rated for 3 hours or more, 3 hours.

C. Leakage Class: Leakage Class II per UL 555S

D. Fusible links, UL 33, shall separate at 165 degrees F.

OR

E. Resettable links shall be provided in lieu of a fusible link. Resettable link shall interrupt power to the actuator causing the actuator's spring return mechanism to cause the damper to close at 165 degrees F. Resettable link to be provided with an electric sensor (thermostat). Sensor to be of the manual reset type and shall be capable of being reset after the temperature has cooled down below the sensor set point.

F. Pressure Differential Rating: 4 In. w. g.

G. Air Flow Velocity: 2000 fpm

H. Elevated Temperature Rating: 350 Deg. F per UL555S

I. Fabricate multiple blade fire dampers with 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

J. Actuators: 24 VDC, 2-position, external mounting

K. Acceptable Manufacturers:
   1. Greenheck Model FSD-211
   2. Ruskin Mfr. Co.
   3. Arrow Damper & Louver.
   4. Imperial Damper Co.

2.12 STANDARD FLEXIBLE CONNECTIONS

A. Provide fabric flexible duct connections.

B. Fabric shall be UL approved, fire-retardant, closely-woven glass, double coated with neoprene, and a minimum of 6 inches wide.

C. Shall be installed at duct connections to all ceiling hung fans and where vibration will be transmitted through ductwork.

D. Approved Manufacturers:
   1. "Ventglas" by Vent Fabrics, Inc.

2.13 HEAVY DUTY FLEXIBLE CONNECTIONS

A. Heavy Duty Flexible Connections shall be used in high pressure (greater than 2 in. w.c.), high temperature (greater than 150 degree F) air applications or where the gas is highly corrosive and the duct connector must be leak proof.

B. Flexible Connectors shall be flanged. If installed outdoors, all metallic components shall be stainless steel construction. Provide flexible connector materials of construction as recommended by the manufacturer for the pressure, temperature, and gas that is being used in air handler system.

C. Approved Manufacturers:
   1. Mercer Rubber Company

2.14 FLEXIBLE DUCTS

A. Comply with SMACNA HVAC Flexible Duct Construction Standards and NFPA 90A.

B. Provide where indicated on the Drawings Flexmaster Type TL- M Flexible Metal UL181 Class I Air Duct.

C. The duct shall be constructed of .005" thick 3003-H14 aluminum alloy in accordance with ASTM B209.

D. The duct shall be spiral wound into a tube and spiral corrugated to provide strength and flexibility.

E. The internal working pressure rating shall be at least 10" w.g. positive and 10" w.g. negative with a bursting pressure of at least 2½ times the working pressure.

F. The duct shall be rated for a velocity of at least 5500 feet per minute.

G. The duct must be suitable for continuous operation at a temperature range of -40° F to +250° F.

H. Factory insulate the flexible duct with fiberglass insulation. The R value shall be at least 4.2 at a mean temperature of 75° F.

I. Cover the insulation with a fire retardant metalized vapor barrier jacket reinforced with crosshatched scrim having a permeance of not greater than 0.05 perms when tested in accordance with ASTM E96, Procedure A.

J. Install flexible metal duct as per SMACNA HVAC Duct Construction Standards Metal and Flexible (Latest Edition).

K. Flexible ductwork shall only be installed where shown on the Drawings.

L. Provide flexible duct supports at all elbows and changes in direction that maybe subject to restriction, collapsing, or pinching to mitigate chance of reduction in cross section area, flow velocities and noise. Duct support shall be minimum radius = duct diameter, nylon polymer construction, with nylon straps. Flexflow elbow, Malco FDS1, or equal.

M. Attachment collars shall be minimum 2 inches in length.

2.15 GALVANIZED STEEL ROUND DUCTS AND FITTINGS

A. Construct ducts of galvanized sheet steel meeting ASTM A 653 with G90 coating designation, and in accordance with the latest SMACNA HVAC Duct Construction Standards Metal and Flexible (Latest Edition).and pressure classifications as stated on the Drawings (minimum 2" w.c. pressure classification). When the ductwork pressure classification of these standards is exceeded, construct galvanized steel round exhaust ductwork in accordance with SMACNA Round Industrial Duct Construction Standards.

B. For ductwork through 60 inches in diameter, provide ducts of spiral lock-seam construction.

C. For ductwork over 60 inches in diameter, provide ducts of welded longitudinal seam construction.

D. For ductwork through 36 inches in diameter, use beaded sleeve transverse joints.

E. For ductwork over 36 inches in diameter, use gasketed-flanged Van Stone transverse joints. Gasket shall be “440 Gasket Tape” by Ductmate Industries, Inc.

F. For ductwork under a positive pressure through 96 in. diameter and 10 in. w. g. no reinforcing is required. For ductwork under a negative pressure in exposed areas use duct gauge that will minimize the use of reinforcing as appropriate for the pressures involved.

G. Draw band joints will not be permitted.

H. All elbows shall be constructed with a centerline radius equal to 1.5 times the duct diameter.

I. Provide matching galvanized steel fittings with continuously welded seams and joints.

J. All take-off connections to duct headers shall be made using tee (90 degrees), lateral (45 degrees), tee cross, lateral cross and “Y” branch fittings of the conical type. All fittings fabricated as separate fittings shall have continuous welds along all seams and joints.

K. The use of two-piece mitered, vaned elbows will be permitted only with specific written approval from the Architect/Engineer. Provide turning vanes as per SMACNA HVAC Duct Construction Standards Metal and Flexible.

2.16 LOUVER BLANK OFF PANELS

A. Facing: 0.032 inch thick aluminum on both sides

B. Perimeter Frame: 0.050 inch thick-formed aluminum channels

C. Core: Expanded polystyrene (EPS), R value of 8

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. Install ductwork in accordance with applicable SMACNA Duct Construction Standards Metal And Flexible and approved submittals, and as shown on the Drawings. Duct sizes shown are inside clear dimensions. Where internal duct liners are used, duct sizes shown are inside clear of liner. For ductwork located outside, provide reinforcing sufficient to support wind and snow loads.

B. The Drawings indicate general locations of ducts. Make additional offsets or changes in direction as required at no additional cost to the Owner.

C. Wherever ductwork is divided, maintain the cross-sectional area.

D. Do not exceed 15-degree taper when constructing duct transitions.

E. Close the open ends of ducts during construction to prevent debris and dirt from entering.

F. Secure casings and plenums to curbs according to the requirements of the SMACNA HVAC Duct Construction Standards Metal and Flexible.

G. Make changes in direction with long radius bends.

H. All unused portions of HVAC supply air and exhaust louvers shall be blanked off with Louver Blank Off Panels, see Ductwork Insulation Section.

I. All welded and scratched galvanized steel surfaces shall be touched up with zinc-rich paint.

J. 2 Hr. rated wall penetration: Where small size duct (up to 6 inches x 6 inches) is penetrating a 2 Hr wall the duct shall be constructed of 16 gauge galvanized sheet metal.

K. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

L. Patch and repair all wall penetrations.

M. Insulation: Where Drawings and Specifications indicate that ducts are to be insulated make provisions for neat insulation finish around damper operating quadrants, splitter adjusting clamps, access doors, and similar operating devices. Metal collar equivalent in depth to insulation thickness and of suitable size to which insulation may be finished to be mounted on duct.

3.02 FITTING INSTALLATION

A. Use minimum of four sheet metal screws per joint.

B. Apply approved sealant on duct-to-duct joint before assembly. Apply additional sealant after assembly to make joint airtight.

3.03 HANGER AND SUPPORT INSTALLATION

A. Support ductwork hung from building structure using trapeze, strap or angle iron hangers conforming to SMACNA HVAC Duct Construction Standards Metal and Flexible. Provide supplemental structural steel to span joists where required.

B. Do not support ductwork from furring, hung ceilings, metal floor deck, metal roof deck or from another duct or pipe.

C. Do not hang lighting fixtures or piping from ductwork.

D. Do not use perforated band iron.

E. Support ductwork at each change in direction.

F. Where duct connects to or terminates at masonry openings or at floors where concrete curbs are not used, provide a continuous 1 ½ inch by 1 ½ inch by 3/16 inch galvanized steel angle support around the ductwork. Bolt and seal the supports to the building construction using expansion bolts and caulking compound. Seal shall be watertight at floor or wall and duct such that a spill will no pass down through the opening.

G. Fasten plenums and casings connected to concrete curbs using continuous 1 ½ inch by 1 ½ inch by ¼ inch galvanized steel angle support. Set the angle support in a continuous bead of caulking

compound and anchor it to the curb with 3/8 inch diameter anchors on 16 inch centers. Terminate sheet metal at curb and bolt to angle support. Seal sheet metal to curb with a continuous bead of caulking.

H. For insulated ductwork, install hangers on the outside of the insulation. To maintain the insulation value, inset a piece of 1 inch thick, 6 pcf fiberglass board with a foil/scrim/kraft (FSK) jacket at these supports.

3.04 SEALING

A. Where ductwork is not continuously welded, soldered or gasketed, make seams and joints airtight with sealants.

B. Install the sealants in accordance with the sealant manufacturer's instructions and recommendations.

C. Seal all ductwork seams, joints, fastener penetrations and fittings connections with sealants in accordance with SMACNA Seal Classifications as required by SMACNA Duct Pressure Classification. All ductwork, regardless of pressure classification, shall have a minimum Seal Class B.

D. Completely fill all voids when liquid sealing ductwork. Several applications may be necessary to fill voids caused by shrinkage or runout of sealant.

3.05 DUCT-MOUNTED DEVICES AND ACCESS DOORS

A. Install all dampers, coils, airflow measuring stations, humidifiers and other duct-mounted devices, specified in other sections of the specifications or as shown and provide transformations to dimensions as required. Install devices in accordance with manufacturer's recommendations. Install dampers and coils a minimum of 4 feet away from changes indirection or transitions. Allow five (5) equivalent diameters of straight ductwork upstream and one (1) equivalent diameter of straight ductwork downstream of airflow measuring devices.

B. Install access doors in ductwork, plenums and where specified and as shown. Provide access doors for inspection and cleaning automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 18 x 18 inch size for shoulder access and as indicated. Install access doors in the bottom of the ductwork unless they are inaccessible in this location; then install the access doors in either the side or top of the ductwork, whichever is more accessible.

C. Provide fire damper at locations indicated, and where outlets pass through fire rated components and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway, duct connections, corrosion resistant springs, bearings, bushings and hinges.

D. Demonstrate re-setting of fire dampers to authorities having jurisdiction and Engineer.

E. Provide flexible connections immediately adjacent to equipment in ducts associated with motorized equipment. Cover connections to medium pressure fans with leaded vinyl sheet, held in place with metal straps.

F. Pilot Ports: Locate pilot ports for measuring airflow in each main supply duct at the downstream end of the straightest run of the main and before the first branch take-off. Form pilot ports by drilling 7/16 inches holes in the duct, lined up perpendicular to airflow on maximum 8-inch centers and at least three to a duct, evenly spaced. Holes to be plugged with plastic plugs. Provide access to these for future rebalancing.

3.06 CONTROL DAMPER INSTALLATION

A. Duct openings shall be free of any obstruction or irregularities that might interfere with blade or linkage rotation or actuator mounting. Duct openings shall measure 1/4" larger than damper dimensions and shall be square, straight, and level.

B. Individual damper sections, as well as entire multiple section assemblies, must be completely square and free from racking, twisting, or bending. Measure diagonally from upper corners to opposite lower corners of each damper section. Both dimensions must be equal ±1/8".

C. Follow manufacturer's instructions for field installation of control dampers. Unless specifically designed for vertical blade application, dampers must be mounted with blade axis horizontal.

D. Install extended shaft or jackshaft per manufacturer's instructions. (Typically, a sticker on the damper face shows recommended extended shaft location. Attach shaft on labeled side of damper to that blade.)

E. Damper blades, axles, and linkage must operate without binding. Before system operation, cycle damper after installation to assure proper operation. On multiple section assemblies, all sections must open and close simultaneously.

F. Provide a visible and accessible indication of damper position on the drive shaft end.

G. Support ductwork in area of damper when required to prevent sagging due to damper weight.

H. After installation of low-leakage dampers with seals, caulk between frame and duct or opening to prevent leakage around perimeter of damper.

I. Dampers that are to be installed with air flow measuring stations shall be installed in duct runs with a minimum amount of straight duct upstream and downstream of the damper to allow accurate flow readings by the air flow measuring station. The Contractor shall verify with the manufacturer the length of straight duct runs required.

3.07 SMOKE DAMPER INSTALLATION

A. Install dampers in accordance with manufacturer’s UL Installation Instructions, labeling, and NFPA 90A at locations indicated on the Drawings.

B. Dampers shall be accessible to allow inspection, adjustment, and replacement of components. Access doors in ductwork, plenums, walls, ceilings, or other general building construction shall be provided. Coordinate with other trades.

C. Where a smoke detector is installed within a duct, the detector shall be installed in the duct a minimum of 6 duct widths downstream from nearest inlet or bend with no air outlets or inlets upstream. The detector shall be listed for the air velocity, temperature and humidity anticipated at the point where it is installed. Other than in mechanical smoke control systems, dampers shall be closed upon fan shutdown where local smoke detectors require a minimum velocity to operate.

D. Where a damper is installed above smoke barrier doors in a smoke barrier, a spot-type detector listed for releasing service shall be installed on either side of the smoke barrier door opening.

E. Where a damper is installed within an unducted opening in a wall, a spot-type detector listed for releasing service shall be installed within 5 feet horizontally of the damper.

F. Where a damper is installed in a corridor wall or ceiling, the damper shall be permitted to be controlled by a smoke detection system installed in the corridor.

G. Where a total-coverage smoke detector system is provided within areas served by an HVAC system, dampers shall be permitted to be controlled by the smoke detection system.

3.08 DUCTWORK AND EQUIPMENT LEAK TESTING

A. Leak test each ductwork system within ten working days of ductwork installation and before ductwork is insulated and concealed.

B. All HVAC ductwork shall be tested. Follow general procedures and use apparatus as outlined in the SMACNA HVAC Air Duct Leakage Test Manual.

C. Test all ductwork at 100 percent of the pressure classifications indicated.

D. Air testing during erection shall include separate leakage air tests of air riser, horizontal distribution system, and, after all ductwork is installed and the central stations apparatus is erected, leakage testing of the whole system.

E. Use Appendix C in the SMACNA HVAC Air Duct Leakage Test Manual to determine allowable leakage rates for each duct section tested.

F. All devices, including access doors, airflow measuring devices, sound attenuators, damper casings, sensors, test ports, etc. that are furnished and/or installed in duct systems shall be

included as part of the duct system leakage allowance. All joints shall be inspected and checked for audible leakage, repaired, if necessary, and retested. Duct leakage shall be limited to the following:

AVERAGE SIZE OF RUN DIAMETER OR EQUIVALENT	*A/100 FT. RUN
12 INCHES OR LESS	10
20 INCHES OR LESS	15
30 INCHES OR LESS	25
40 INCHES OR LESS	30
50 INCHES OR LESS	30
* (A) = PERMISSIBLE LOSS IN CFM	

A. Total system leakage shall not exceed 10 percent of the scheduled design capacity of the system when tested as per SMACNA testing methods.

3.09 PAINTING

A. Upon completion of the installation, remove all protecting materials, thoroughly remove all scale and grease and leave in a clean condition for painting. Ductwork to be painted shall be as shown on the Drawings. Painting shall be in accordance with the requirements of the “Painting” Specification Section.

3.10 DUCTWORK MATERIAL SCHEDULE

AIR SYSTEM	DUCTWORK MATERIAL
SUPPLY, OUTSIDE AIR & EXHAUST DUCTWORK	GALVANIZED STEEL
KITCHEN EXHAUST	BLACK IRON
SHOWER ROOM EXHAUST	ALUMINUM
DUCTWORK EXPOSED TO WEATHER	ALUMINUM
DISHWASHER HOOD EXHAUST	TYPE 302 OR 304 STAINLESS STEEL
LABORATORY EXHAUST FUME HOOD	TYPE 316 STAINLESS STEEL
CLOTHES DRYER EXHAUST	RIGID METAL

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Provide exhaust fans, as specified herein, with accessories and of sizes and capacities as noted here-in, and as scheduled and in locations shown on drawings.

B. Products listed in Part 2 of this Section include:
   1. Centrifugal Up / Down Blast Fans

1.02 ACCESSORIES:

A. Provide accessories as scheduled. Refer to controls diagrams and specifications, sequence of operations specifications and electrical drawings for detailed requirements.
   1. Back draft dampers
   2. Motorized dampers with appropriately sized actuators
   3. Motor speed controls, interlock and control and monitoring devices
   4. Disconnect switches
   5. Roof curbs
   6. Curb Adapters
   7. Wind or Seismic restrains, guy wires, etc.

1.03 RELATED WORK

A. Section 061000: Rough Carpentry

B. Section 076200: Flashing and Sheet Metal

C. Section 079200: Joint Sealants

D. Section 230010: General Mechanical Requirements

E. Section 230594: Balancing of Air Systems

F. Section 230991: Instrumentation and Controls Integration

G. Section 230993: Sequence of Operations

1.04 REFERENCE CODES AND STANDARDS

A. AMCA 99 - Standards Handbook

B. AMCA 210 - Laboratory Methods of Testing Fans for Rating

C. AMCA 300 - Reverberant Room Method for Sound Testing of Fans

D. ASHRAE Handbook, HVAC Applications Volume “Sound and Vibration Control”

E. UL listed and labeled.

1.05 SUBMITTALS

A. Submit for review, products utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Exhaust Fan Product Data Submittal
      a. Assembly Drawings - Show fan layout, housing, materials, gauges, dimensions, weights and installation details
      b. Product data - Manufacturer’s fan performance (data includes cfm, rpm, bhp, motor nameplate data, tip speed, outlet velocity and static pressure) and sound performance (data includes sound power level ratings by octave bands) as tested in accordance with AMCA Standards 210 and 300.
      c. Fan performance curves - Submit curves for all fans with system performance shown, and for plus or minus 10 percent and plus or minus 20 percent change in fan rpm. Curves shall include plotted rpm, horsepower, cfm, static pressure, and fan surge line and operating point.
      d. Certified AMCA Ratings - Submit ratings for air and sound performance.
      e. UL Listing - Submit listing if specified.

1.06 QUALITY ASSURANCE

A. Factory balance each fan statically and dynamically, test run before shipment, and key fan wheel to fan shaft. Fans shall operate quietly and without pulsation or vibration. Conduct sound power level tests for each type fan at the factory in accordance with AMCA 300.

B. Fans shall operate in the stable range of their performance curves.

C. The fan external static pressures shown in the schedules are those required by the ductwork and apparatus, and do not include the internal and intake fan losses, inlet vanes or integral outlet dampers, inlet screens, outlet velocity heads or drive losses.

D. Factory performance test each fan assembled in or as part of apparatus specified to be performance tested. Test shall display scheduled performance characteristics, using certified, calibrated testing instruments provided by the manufacturer of the apparatus.

E. All fan performance ratings shall be based up on factory tests performed in accordance with AMCA 210 and 300. One fan of each type specified shall have actual factory performance tests performed prior to shipment. All fans shall be certified by AMCA and carry its seal.

PART 2 - PRODUCTS

2.01 CENTRIFUGAL UP/DOWNBLAST FANS

A. Roof mounted exhaust fans shall be of the up or down blast direct drive type, as scheduled.

B. The fan housing shall fan housing shall consist of the motor cover, shroud, curb cap and lower windband, and shall be constructed of heavy-gauge aluminum. Housing shall have a rigid internal support structure and leakproof design. The fan shroud shall be one-piece with a rolled bead for extra strength, which directs exhaust air downward. The low windband shall be one piece with formed edges for added strength and the curb cap shall include prepunched mounting holes to ensure correct attachment to the roof.

C. The fan wheel shall be centrifugal, non overload, backward-inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced.

D. Upblast fans for use with kitchen exhaust or grease laden air shall be provided with a grease drain, grease cup and inspection and clean out access doors.

E. Motors shall be permanently lubricated and carefully matched to the fan loads. Motors shall be readily accessible for maintenance. Motors shall be mounted on true vibration isolators, out of the airstream. Each vibration isolator shall be sized to match the weight of each fan.

F. A NEMA 1 disconnect switch shall be provided as standard. Factory wiring shall be provided from motor to the handy box.

G. All fans shall bear the AMCA Certified Ratings Seal for both sound and air performance.

H. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.

I. Fans shall be manufactured by Greenheck or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Install fans, including all necessary structural supports and bracing as scheduled and located on the contract drawings in accordance with manufacturer’s instructions and approved submittals.

B. Connect duct to fans to allow for straight and smooth air flow.

C. Provide flexible connections (minimum of 4”) between fan and duct.

D. Install fan level: +/- 5 degrees vertical. Final installation shall be free of all leaks from both fan and associated ductwork.

3.02 START-UP, TESTING, DEMONSTRATION

A. Start-up fans after checkout to insure proper alignment and phased electrical connections.

B. Test fans individually and as part of system.

C. Insure supply / exhaust fans and dampers are properly interlocked, operate with control system as required to maintain building pressurization and exhaust per design documents and for proper building operation.

D. Provide all associated start-up and testing reports.

E. Demonstrate operation to Owner and instruct maintenance personnel in operation of equipment.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the air terminals as specified herein, with capacities, distribution patterns and connection sizes as scheduled on the Drawings.

B. Products listed in Part 2 of this Section include:
   1. Grilles and Registers.
   2. Ceiling Diffusers.

1.02 RELATED WORK

A. Section 233113: Sheet Metal Work

1.03 REFERENCES

A. ADC 1062 GRD - Test Code for Grilles, Registers and Diffusers

B. ASHRAE 70 - Method of Testing for Rating the Airflow Performance of Outlets and Inlets.

C. ASHRAE 113 - Method of Testing Room Air Diffusion

D. ASTM C423 - Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

E. ARI 880 - Air Terminals

F. ARI 885 - Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets.

G. NFPA 90A - Installation of Air Conditioning and Ventilation Systems

H. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

I. Mechanical Code of New York State

1.04 QUALITY ASSURANCE

A. Air Terminals will not be accepted until acoustical test results have been submitted and approved.

1.05 SUBMITTALS

A. Submit for review, products utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Diffusers, Registers, and Grilles Product Data Submittal
      a. Product data - Submit catalog cuts and installation instructions for all products specified, including standard color samples.
      b. Submit published manufacturer’s performance data for all of the different types of diffusers, registers and grilles, based on testing in accordance with ASHRAE Standard 70, latest edition.
      c. Performance data - For each size and type of air terminal , submit the following:
         1) Inlet static pressure in inches w.g.
         2) Maximum and minimum airflow in cfm.
         3) Throw in feet at maximum cfm (and 25 percent of cfm) for terminal velocities of 50 and 100 fpm.
         4) Noise Criteria (NC) curve at maximum air terminal cfm rating with blades in full-open and closed positions.

PART 2 - PRODUCTS

2.01 CEILING DIFFUSERS

A. General:
   1. Typical for all diffusers sypplying conditioned air:
      a. Provide with molded fiberglass insulation blanket with foil back vapor barrier minimum R 4.2.

B. Stamped Ceiling Diffusers:

1. Furnish and install stamped ceiling diffusers of the sizes and capacities as shown on the Drawings.
2. Manufacture the diffuser from corrosion-resistant steel or extruded aluminum as indicated on the Drawings.
3. Construct the diffuser with four die-formed concentric cones in all sizes. Construct the inner cone assembly to be removable using a spring clip arrangement that permits quick, easy installation and removal.
4. Provide units with radial opposed blade dampers. Provide the diffuser with a removable plug for screwdriver adjustment of the damper without removing the inner core.
5. Manufacture diffusers with trim to allow for recessed mounting in into ceiling grids or for surface mount in other ceiling types.
6. Manufacturer: Nailor Industries Inc, Model Series UNI, RNS or approved equal.
7. Coordinate color with Owner

C. Architectural Ceiling Diffusers:
1. Furnish and install architectural ceiling diffusers of the sizes and capacities as shown on the Drawings.
2. Manufacture the diffuser from corrosion-resistant steel or extruded aluminum as indicated on the Drawings.
3. Construct the units of a stamped outer core and with the inner core having a plaque style face. Construct the face with a double skinned inner face panel with a hemmed edge. Manufacture the inner core assembly to be removable using a spring clip arrangement that permits quick, easy installation and removal.
4. Manufacture diffusers with trim to allow for with face panel flush with the ceiling line into ceiling grids or for surface mount in other ceiling types.
5. Provide an opposed blade radial volume damper, with an operating arm to adjust the damper without removing the core. Unit collar height; 1 ¼” in height.
6. Provide an equalizing grid for field installation for each diffuser.
7. Manufacturer: Nailor Industries Inc., Model Series UNI or approved equal.
8. Coordinate color with Owner.

D. Architectural High Ceiling Perforated Diffusers:
1. Furnish and install architectural high ceiling perforated diffusers of the sizes and capacities as shown on the Drawings.
2. Manufacture the diffuser from corrosion-resistant steel.
3. Construct the units of a stamped one-piece outer cone and a heavy gauge inner face panel with a hemmed edge.
4. Perforated face shall have 3/8” diameter holes on 5/8” staggered centers.
5. Provide an opposed blade radial volume damper, with an operating arm to adjust the damper without removing the core. Unit collar height; 1 ¼” in height.
6. Manufacturer: Nailor Industries Inc., Model Series UNI-PD or approved equal.
7. Coordinate color with Owner.

E. Architectural High Ceiling Adjustable Downblast Diffusers:
1. Furnish and install architectural high ceiling perforated diffusers of the sizes and capacities as shown on the Drawings.
2. Manufacture the diffuser from corrosion-resistant steel.
3. Construct the units of a stamped one-piece outer cone and a inner core that has a square face plate and includes a round, easily adjustable radial vane in the center.
4. The radial vane shall have a ring operator that allows for pole operation.
5. Provide an opposed blade radial volume damper, with an operating arm to adjust the damper without removing the core. Unit collar height; 1 ¼” in height.
6. Manufacturer: Nailor Industries Inc., Model Series UNI-AD or approved equal.
7. Coordinate color with Owner.

2.02 RETURN GRILLES

A. Furnish and install return grilles of the type and size as shown on the Drawings. Construct the grilles with 45 degree deflection fixed blades and frames that have reinforced mitered corners.

B. Align grille blade orientation to minimize line of sight of inside of duct - coordiante with Architect.

C. Provide an opposed blade damper operable from the face of the grille for grilles connected to ductwork.

D. Manufacture grilles with trim to allow for recessed mounting into ceiling grids or for surface mount in other ceiling types. Provide concealed mounting using concealed mounting straps or concealed screw holes in neck. Countersunk screw holes in the frame face are not acceptable or frame face-mounting screws.

E. Construct the units of extruded aluminum or corrosion resistant steel as shown on the Drawings.

F. Manufacturer: Nailor Industries Inc, Model Series 6145H-O or approved equal.

G. Coordinate color with Owner.

2.03 HEAVY DUTY STEEL RETURN GRILLES

A. Furnish and install heavy duty return grilles of the type and size as shown on the Drawings. Construct the grilles with 45 degree deflection fixed 14 gauge steel blades spaced on ½" centers and a heavy duty 16 gauge steel welded frame.

B. Provide an opposed blade damper operable from the face of the grille for grilles connected to ductwork.

C. Manufacture grilles with trim to allow for recessed mounting into ceiling grids or for surface mount in other ceiling types. Provide concealed mounting using concealed mounting straps or concealed screw holes in neck. Countersunk screw holes in the frame face are not acceptable or frame face-mounting screws.

D. Construct the units of extruded aluminum or corrosion resistant steel as shown on the Drawings.

E. Manufacturer: Nailor Industries Inc, Model Series 6145H-HD-O or approved equal.

F. Coordinate color with Owner.

2.04 HEAVY DUTY ALUMINUM RETURN GRILLES

A. Furnish and install heavy duty return grilles of the type and size as shown on the Drawings. Construct the grilles with 0 degree deflection aluminum blades spaced on ½" centers and a heavy duty aluminum welded frame.

B. Provide an opposed blade damper operable from the face of the grille for grilles connected to ductwork.

C. Manufacture grilles with trim to allow for recessed mounting into ceiling grids or for surface mount in other ceiling types. Provide concealed mounting using concealed mounting straps or concealed screw holes in neck. Countersunk screw holes in the frame face are not acceptable or frame face-mounting screws.

D. Construct the units of extruded aluminum or corrosion resistant steel as shown on the Drawings.

E. Nailor Industries Inc, Model Series 51FH-HD-OA or approved equal.

F. Coordinate color with Owner.

2.05 SUPPLY GRILLES

A. Furnish and install supply grilles of the type and size as shown on the Drawings. Construct the grilles with a dual set of streamlined shaped, roll-formed, corrosion-resistant blades that are adjustable, and spaced on ¾" centers and frame with reinforced mitered corners.

B. Manufacture grilles with trim to allow for recessed mounting into ceiling grids or for surface mount in other ceiling types. Provide concealed mounting using concealed mounting straps or concealed screw holes in neck. Countersunk screw holes in the frame face are not acceptable nor are frame face-mounting screws.

C. Construct the units of extruded aluminum or corrosion resistant steel as shown on the Drawings.

D. Manufacturer: Nailor Industries Inc., Model Series 61DH-O or approved equal.

E. Coordinate color with Owner.

2.06 TRANSFER GRILLES

A. Furnish and install supply grilles of the type and size as shown on the Drawings. Grilles shall be sight proof.

B. Construct the units of extruded aluminum or corrosion resistant steel as shown on the Drawings.

C. The grille shall have inverted “V” shaped blades and frames. The grille shall be sight-proof.

D. Manufacturer: Nailor Industries Inc., Model Series 61DGS or approved equal.

E. Coordinate color with Owner.

2.07 LINEAR DIFFUSERS

A. Furnish and install linear slot diffusers and accessories of the size and type shown on the drawings. Mechanical contractor shall coordinate installation with General Contractor and other subcontractors as required.

B. The linear slot diffuser shall utilize heavy wall extruded aluminum frames and be capable of supporting the ceiling system. Material shall be minimum wall thickness 0.06" (1.52). Diffuser frames shall be supplied with integral spacer bars and hanger brackets, spaced approximately on 24" (610) centers. In hard ceiling installations, provide support clips by the manufacturer that allow the diffusers to be secured to the ceiling diffuser opening framing channels.

C. The linear slot diffuser shall be complete with factory end border configurations as shown or indicated. Where exposed end caps are required, they shall be factory installed architectural mitered picture frame type. Flanges/butt type end caps are not acceptable.

D. Provide alignment strips and spline clips by the manufacturer to secure joints and ceiling tees to the linear diffuser as required. Mitered corner sections shall be supplied by the manufacturer in one-piece construction.

E. The air pattern controller shall be dual type on 24" (610) centers and fully adjustable to permit various air pattern configurations, as well as allow throttling, as required for air volume reduction or complete shut-off without adding any blank-off devices. Pattern controllers shall be minimum 20 ga. (1.01) corrosion-resistant steel. One-piece pattern controllers are not acceptable.

F. Linear slot diffusers shall incorporate vertical jet throw pattern controllers.

G. All diffusers shall have a single slot, unless shown otherwise, and shall be capable of being used for supply, return or exhaust air.

H. Supply air engineered plenum boots shall be minimum 22 ga. (0.85) coated steel and of the same manufacturer as the linear slot diffuser. Lengths and inlet sizes shall be as indicated on the plans and schedules. Where required, plenums shall be insulated with either internal matt faced fiberglass insulation or external foil back insulation, as specified on drawings or schedules. Return hood/sight baffles shall be provided as shown.

I. Pattern controllers and integral spacers shall be painted flat black.

J. Performance of the linear slot diffuser shall be based upon cataloged data obtained from tests conducted in accordance with ASHRAE Standard 70, latest edition. Pattern controllers shall be field adjusted after diffuser installation and set in their normal operating condition. Air test and balancing of linear slot diffusers shall be in accordance with the testing and balancing portion section of the specifications.

K. Provide manufacturers submittal drawings and published performance data.

L. Manufacturer: Nailor Industries Inc., Continuous Flowline Series Model FLV15 or approved equal.

2.08 LINEAR SLOT SUPPLY AND RETURN DIFFUSERS

A. Furnish and install linear slot diffusers of the type and size as shown on the plans and air distribution schedules.

B. The maximum length of a single section shall be 72” long. All sizes larger than 72” shall be provided in continuous multiple sections. Alignment strips shall be provided for joining continuous diffuser sections together.

C. The frame borders and end caps shall be extruded aluminum with extruded aluminum spacers.

D. The linear slot shall be supplied in 1 to 10 slots wide as specified.

E. Pattern deflectors shall have an aerodynamic ‘ice tong’ shape that can be adjusted to regulate the volume and direction of the airflow. The maximum length of the deflectors shall be 36”, longer sizes shall be provided in multiple sections. The pattern deflector finish shall be black.

F. Provide inactive sections with blank-offs, end caps, 90 degree mitered corners, etc. as necessary to provide a continuous appearance in areas with multiple section assemblies.

G. Manufacturer of Linear Slot Diffusers shall be Nailor Industries Inc., Model Series 5000 or approved equal.

H. Coordinate color with owner.

2.09 LINEAR SLOT DIFFUSER PLENUMS

A. Furnish and install plenums for linear slot diffusers of the sizes and capacities as shown on the plans and air distribution schedule.

B. The plenums shall be manufactured from corrosion-resistant steel and shall include a side inlet for connection to the duct.

C. The width shall fit a 1, 2, 3, or 4 slot linear diffuser as specified and the length shall be in standard nominal lengths of 20”, 24”, 30”, 36”, 48”, and 60”.

D. When continuous sections are required, the end caps shall be folded up for uninterrupted airflow.

E. Models 5310I, 5375I, and 5350I shall have internal insulation.

F. Manufacturer of Linear Slot Diffuser Plenums shall be Nailor Industries Inc., Model Series 5300 or approved equal.

2.10 LINEAR FLOOR DIFFUSERS

A. Furnish and install linear floor diffusers of the type and size as shown on the plans and air distribution schedules.

B. Linear floor diffusers shall be designed for installation in the floor.

C. The diffuser shall have 15 degree deflection bars set on ½” centers.

D. The entire assembly shall be constructed of etched and anodized extruded aluminum.

E. Manufacturer of Linear Floor Diffusers shall be Reliable Products Model LFD15 or approved equal.

F. Coordinate color with owner.

PART 3 - EXECUTION

3.01 DIFFUSER, REGISTER AND GRILLE APPLICATION

A. See the Drawings for types, sizes, materials and installation requirements.

3.02 INSTALLATION

A. Install diffusers, grilles and registers in locations shown on the Drawings.

B. Consult the Drawings for type of ceiling in which the terminals are to be installed and match air outlet edge trim to the requirements of the ceiling type in which they are installed.

C. Install equalizing grids flush with take-off collar connection to supply duct with vanes perpendicular to air flow approaching diffuser.

D. Install in accordance with manufacturer's published recommendations as well as applicable sections of SMACNA manual and as specified above.

E. Install ceiling mounted grilles and registers with the blade deflection facing away from the line of sight.

F. Ductwork insulation, as required per insulation schedule, shall be continuous from supply duct mains, flex ducts (if applicable), up to, and sealed with supply diffuser molded insulation blanket with continuous vapor barrier, regardless of ceiling plenum condition.

G. Coordinate with other work, including ductwork and ductwork accessories, as necessary to interface installation of air outlets and inlets with other work

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Packaged rooftop units and custom roof curbs.

1.02 REFERENCES

A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

B. AMCA 99—Standards Handbook

C. AMCA 210—Laboratory Methods of Testing Fans for Rating Purposes

D. AMCA 500—Test Methods for Louvers, Dampers, and Shutters.

E. AHRI 340/360 - Unitary Large Equipment

F. NEMA MG1—Motors and Generators

G. National Electrical Code.

H. NFPA 70—National Fire Protection Agency.

I. SMACNA—HVAC Duct Construction Standards—Metal and Flexible.

J. UL 900—Test Performance of Air Filter Units.

1.03 SUBMITTALS

A. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, electrical characteristics, and connection requirements.

B. Product Data:
   1. Provide rooftop unit and curb literature that indicates dimensions, weights, capacities, ratings, fan performance, and electrical characteristics and connection requirements.
   2. Provide computer-generated fan curves with the specified operating point clearly plotted.
   3. Manufacturer’s Installation Instructions.
   4. Custom roof curb, wind-rated, return air plenum, acoustical package, return air opening offet to clear steel.

1.04 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Provide instructions for installation, maintenance, and service.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section, with a minimum of five years documented experience, who issues complete catalog data on the total product.

B. Startup must be done by trained personnel experienced with rooftop equipment.

C. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters and remote controls are in place, bearings lubricated, and manufacturers’ installation instructions have been followed.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to the site.

B. Accept products on site and inspect for damage.

C. Store in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.07 WARRANTY

A. Parts: Standard 1 year.

B. Compressor: Additional 4 years, five years total.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Daikin Applied
   1. Deducts for alternative equipment will be considered:
      a. Trane.
      b. Carrier.

2.02 GENERAL DESCRIPTION

A. Furnish as shown on plans, Daikin Applied Rebel Single Zone Heating and Cooling Unit(s) model DPS. Unit performance and electrical characteristics shall be per the job schedule.

B. Configuration: Fabricate as detailed on prints and drawings. Typical sections may include:
   1. Return plenum/economizer section
   2. Energy recovery wheel section
   3. Filter section
   4. Heating coil section
   5. Cooling coil section
   6. Supply fan section
   7. Exhaust fan selection
   8. Condensing unit section

C. The complete unit shall be cETLus listed.

D. The unit shall be ASHRAE 90.1-2019 compliant and labeled.

E. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Each unit shall be completely factory assembled and shipped in one piece. Packaged units shall be shipped fully charged with R-32 Refrigerant and oil.

F. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test, and a final unit inspection.

G. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating, and maintenance bulletins and start-up forms shall be supplied with each unit.

H. Performance: All scheduled EER, IEER, capacities, and face areas are the minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.

I. Warranty: The manufacturer shall provide a 12-month parts-only warranty. Defective parts shall be repaired or replaced during the warranty period at no charge. The warranty period shall commence at startup or six months after shipment, whichever occurs first.

2.03 CABINET, CASING, AND FRAME

A. Panel construction shall be double-wall construction for all panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be a minimum of 1" thick with an R-value of 7.0 on sizes 3-17 tons, and 2” 2" thick with an R-value of 13 for 16-31 Tons, and shall be 2-part injected foam. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 5.0 inches (127 mm) w.g.

B. Exterior surfaces shall be constructed of painted galvanized steel for aesthetics and long-term durability. Paint finish will include a base primer with a high-quality polyester resin topcoat. Finished, unabraded panel surfaces shall be exposed to an ASTM B117 salt spray environment and exhibit no visible red rust at a minimum of 3,000 hours of exposure. Finished, abraded surfaces shall be tested per ASTM D1654, having a mean scribe creepage not exceeding 1/16” at 1,000 hours minimum exposure to an ASTM B117 salt spray environment. Measurements of

results shall be quantified using ASTM D1654 in conjunction with ASTM D610 and ASTM D714 to evaluate blister and rust ratings.

C. Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple stainless-steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.

D. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal.

2.04 OUTDOOR/RETURN AIR SECTION

A. Daikin Applied UltraSeal low-leak dampers shall be provided. Damper blades shall be fully gasketed and side-sealed, and arranged vertically in the hood. Damper leakage shall be less than 1.5 CFM/Sq. Ft. of damper area at 1.0-inch static pressure differential. Leakage rate to be tested in accordance with AMCA Standard 500. Damper blades shall be operated from multiple sets of linkages mounted on the leaving face of the dampers. Control of the dampers shall be from a factory-installed actuator.

B. Control of the outdoor dampers shall be by a factory-installed actuator. The damper actuator shall be of the modulating type. The damper opens when the supply fan starts, and closes when the supply fan stops.

C. Provide a field-installed Duct/Space-mounted C02 sensor. Outside air damper position will modulate between the Demand Control Ventilation Limit (minimum position setpoint) and the Ventilation Limit (maximum non-economizer position setpoint) to satisfy the space requirements. Damper position will be controlled to the greater of the two command signals, either the minimum outside air flow or space IAQ (CO2).

2.05 ENERGY RECOVERY

A. The rooftop unit shall be provided with an AHRI-certified rotary wheel air-to-air heat exchanger in a cassette frame complete with seals, drive motor, and drive belt. The energy recovery wheel shall be an integral part of the rooftop unit with unitary construction and does not require field assembly. Bolt-on energy recovery units that require field assembly and section-to-section gasketing and sealing are not acceptable.

B. The wheel capacity, air pressure drop, and effectiveness shall be AHRI certified per AHRI Standard 1060. Thermal performance shall be certified by the manufacturer in accordance with ASHRAE Standard 84, Method of Testing Air-to-Air Heat Exchangers, and AHRI Standard 1060, Rating Air-to-Air Heat Exchangers For Energy Recovery Ventilation Equipment.

C. The rooftop unit shall be designed with a track so that the entire energy recovery wheel cassette can slide out from the rooftop unit to facilitate cleaning

D. The unit shall have 2” MERV 8 filters for the outdoor air before the wheel to help keep the wheel clean and reduce maintenance. Filter access shall be by a hinged access door with ¼ turn latches.

E. The matrix design shall have channels to reduce cross-contamination between the outdoor air and the exhaust air. The layers shall be effectively captured in aluminum and stainless-steel segment frames that provide a rigid and self-supporting matrix. All diameter and perimeter seals shall be provided as part of the cassette assembly and shall be factory set. Drive belt(s) of stretch urethane shall be provided for wheel rim drive without the need for external tensioners or adjustment.

F. The total energy recovery wheel shall be coated with silica gel desiccant permanently bonded without the use of binders or adhesives, which may degrade desiccant performance. The substrate shall be a lightweight polymer and shall not degrade nor require additional coatings for application in marine or coastal environments. Coated segments shall be washable with detergent or alkaline coil cleaner and water. Desiccant shall not dissolve nor deliquesce in the presence of water or high humidity.

G. Wheels shall be provided with a removable energy transfer matrix. Wheel frame construction shall be a welded hub, spoke, and rim assembly of stainless, plated, and/or coated steel and shall be self-supporting without matrix segments in place. Segments shall be removable without the use of tools to facilitate maintenance and cleaning.

H. Wheel bearings shall be selected to provide an L-10 life in excess of 400,000 hours. The rim shall be continuously rolled stainless steel. Wheels shall be connected to the shaft by means of taper lock hubs.

I. The exhaust air fan shall be a direct drive SWSI plenum fan. The exhaust fan shall be sized for the airflow requirements per the construction schedule. The unit controller shall control the exhaust fan to maintain building pressure. A VFD shall be provided for the exhaust fan motor, or the exhaust fan motor shall be an ECM motor. The rooftop unit shall have a single-point electrical power connection and shall be ETL listed

J. The control of the energy recovery wheel shall be an integral part of the rooftop unit's DDC controller. The DDC controller shall have visibility of the outdoor air temperature, leaving wheel temperature, return air temperature, and exhaust air temperature. These temperatures shall be displayed at the rooftop unit's DDC controller LCD display. All of these temperatures shall be made available through the BACnet interface.

K. The rooftop unit with the energy recovery wheel shall incorporate the economizer operation. The energy recovery wheel shall have a bypass damper. When the unit is in the economizer mode of operation, the energy recovery wheel shall stop, and the bypass dampers shall be opened. The outdoor air shall be drawn through the bypass dampers to reduce the pressure drop of the outdoor airstream.

L. The rooftop unit (DDC controller shall provide frost control for the energy recovery wheel. When a frost condition is encountered, the unit controller shall stop the wheel. When in the frost control mode, the wheel shall be jogged periodically and not be allowed to stay in the stationary position.

2.06 FILTERS

A. 2" thick MERV 13 for main unit.

B. 2" thick MERV 8 for return air/energy recovery wheel.

2.07 EXHAUST FAN

A. Exhaust fan shall be a single-width, single-inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with aluminum fan blades that are continuously welded to the hub plate and end rim. The exhaust fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.

B. The fan motor shall be a totally-enclosed EC motor that is speed-controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operating in the event of a loss of phase. Motors shall be premium efficiency.

C. The unit DDC controller shall provide building static pressure control. The unit controller shall provide proportional control of the exhaust fans from 25% to 100% of the supply air fan designed airflow to maintain the adjustable building pressure setpoint. The field shall mount the required sensing tubing from the building to the factory-mounted building static pressure sensor.

D. Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2" prefilter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2" MERV 13 construction filters. The contractor shall furnish and install, at building occupancy, the final set of filters per the contract documents.

2.08 COOLING COIL

A. The indoor coil section shall be installed in a draw-through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double-sloped drain pan.

B. The direct expansion (DX) cooling coils shall be fabricated of seamless high-efficiency copper tubing that is mechanically expanded into high-efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high-pressure air under water.

C. The cooling coil shall have an electronically controlled expansion valve. The unit controller shall control the expansion valve to maintain liquid subcooling and the superheat of the refrigerant system.

D. The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.

E. The drain pan shall be stainless steel and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit base.

F. A drain pan overflow safety shall shut off the unit and issue a warning before overflow occurs.

2.09 HOT GAS REHEAT

A. Unit shall be equipped with a fully modulating hot gas reheat coil with hot gas coming from the unit condenser.

B. Hot gas reheat coil shall be a Micro Channel design. The aluminum tube shall be a microchannel design with high-efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.

C. The modulating hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil and reheat coil leaving air temperature setpoints shall be adjustable through the unit controller. During the dehumidification cycle, the unit shall be capable of 100% of the cooling capacity. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F.

D. Each coil shall be factory leak tested with high-pressure air under water.

2.10 SUPPLY FAN

A. The supply fan shall be a single-width, single-inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.

B. Supply fan and motor assembly combinations larger than 8 hp or 22” diameter shall be internally isolated on 1” deflection, spring isolators, and include removable shipping tie downs.

C. The fan motor shall be a totally enclosed EC motor that is speed-controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operating in the event of a loss of phase. Motors shall be premium efficiency.

D. The supply fan shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.

2.11 VARIABLE AIR VOLUME CONTROL

A. The unit controller shall proportionally control the Electronically Commutated Motors (ECM) on the supply and exhaust fans. The supply fan shall be controlled to maintain an adjustable duct pressure setpoint. A duct static pressure sensor shall be factory-mounted in the control panel. The field shall furnish and install the pneumatic tubing for the duct static pressure sensor and the building pressure sensor. The field shall furnish and install the outdoor air pressure sensor.

B. The unit controller shall proportionally control the ECM motors on the supply fan based on space temperature. The unit controller shall increase/decrease the speed of the supply fan in order to

maintain the space temperature within its setpoint and dead band. The unit controller shall provide discharge air temperature control with the compressor modulation.

C. The unit manufacturer shall install all power and control wiring.

D. The supply air fan drive output shall be controlled by the factory-installed main unit control system, and drive status and operating speed shall be monitored and displayed at the main unit control panel.

2.12 HOT WATER HEATING SECTION

A. Coordinate valving and piping arrangement with inline freeze pump.

B. A hot water heating coil shall be factory-installed in the heating section. The hot water heat section shall be installed downstream of the supply air fan. A factory-tested diffuser shall be used in order to provide air distribution across the coil. The rooftop unit shall include a piping vestibule. The coil connection shall terminate in the vestibule. All coil connections shall be copper; steel connections shall not be allowed in order to prevent dielectrics and corrosion.

C. Coils shall be fabricated of seamless 3/8" diameter copper tubing that is mechanically expanded into high-efficiency rippled and corrugated aluminum plate fins. All coil vents and drains shall be factory-installed. Hot water coil shall be fully cased to allow for easy replacement.

D. The control valve shall be field-supplied and installed in the heating vestibule. The control valve shall be capable of receiving a 2 – 10 Vdc signal. The wire harness from the unit controller to the control valve shall be factory-installed.

E. The coil shall have freeze protection and shall be controlled by the unit DDC controller. With the detection of a freeze condition, the heating coil valve shall be driven fully open. The unit controller shall indicate an alarm.

F. Coil shall be factory leak tested with high-pressure air under water.

2.13 CONDENSING SECTION

A. Outdoor coils shall be cast aluminum, micro-channel coils. Plate fins shall be protected and brazed between adjoining flat tubes such that they shall not extend outside the tubes. A sub-cooling coil shall be an integral part of the main outdoor air coil. Each outdoor air coil shall be factory leak tested with high-pressure air under water.

B. Outdoor air coils shall be protected from incidental contact with coil fins by a coil guard. Coil guard shall be constructed of cross-wire welded steel with PVC coating.

C. Fan motors shall be an ECM-type motor for proportional control. The unit controller shall proportionally control the speed of the condenser fan motors to maintain the head pressure of the refrigerant circuit in ambient conditions up to 125°F. Mechanical cooling shall be provided to 0°F. Heat Pump Heating shall be provided to -10°F. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operating in the event of a loss of phase.

D. The condenser fan shall be a low-noise blade design. Fan blade design shall be a dynamic profile for low tip speed. The fan blade shall be of a composite material.

E. The unit shall have scroll compressors. One of the compressors shall be an inverter compressor providing proportional control. The unit controller shall control the speed of the compressor to maintain the discharge air temperature. [The inverter compressor shall have a separate oil pump and an oil separator for each compressor that routes oil back to the compressor instead of through the discharge line.

F. Pressure transducers shall be provided for the suction pressure and head pressure. A temperature sensor shall be provided for the suction temperature and the refrigerant discharge temperature of the compressors. All of the above devices shall be an input to the unit controller, and the values shall be displayed at the unit controller.

G. Refrigerant circuit shall have a bypass valve between the suction and discharge refrigerant lines for low head pressure compressor starting and increased compressor reliability. When there is

a call for mechanical cooling, the bypass valve shall open to equalize the suction and discharge pressures. When pressures are equalized, the bypass valve shall close, and the compressor shall be allowed to start.

H. Each circuit shall be dehydrated and factory charged with R32 Refrigerant and oil.

2.14 ELECTRICAL

A. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be numbered, color-coded, and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory-wired weatherproof control panel. Unit shall have a single-point power terminal block for the main power connection. A terminal board shall be provided for low-voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for the field wiring entrance.

B. A GFI receptacle shall be unit-mounted. The receptacle shall be powered by a factory-installed and wired 120V, 15-amp power supply. The power supply shall be wired to the line side of the unit's main disconnect, so the receptacle is powered when the main unit disconnect is off. This option shall include a GFI receptacle, a 2.0 KVA transformer, and a branch circuit disconnect. The electrical circuit shall be complete with primary and secondary overload protection.

C. A single non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. Disconnect switches shall be mounted internally to the control panel and operated by an externally mounted handle.

2.15 CONTROLS

A. Provide BACnet or approved protocol interface to the ATC system.

B. Provide a complete integrated microprocessor-based Direct Digital Control (DDC) system to control all unit functions, including temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller, and keypad/display operator interface. All MCBs and sensors shall be factory-mounted, wired, and tested.

C. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.

D. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.

E. All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.

F. The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to ensure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays, each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.

G. The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password-protected against unauthorized changes. For ease of service, the display format shall

be an English-language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:

1. Return air temperature
2. Discharge air temperature
3. Outdoor air temperature
4. Space air temperature
5. Outdoor enthalpy, high/low
6. Compressor suction temperature and pressure
7. Compressor head pressure and temperature
8. Expansion valve position
9. Condenser fan speed
10. Inverter compressor speed
11. Dirty filter indication
12. Airflow verification
13. Cooling status
14. Control temperature (Changeover).
15. VAV box output status
16. Cooling status/capacity
17. Unit status
18. All time schedules
19. All time schedules
20. Previous alarms with time and date
21. Optimal start
22. Supply fan and exhaust fan speed
23. System operating hours

H. The user interaction with the keypad shall provide the following:
   1. Controls mode
   2. Cooling and heating change-over temperature with deadband
   3. Cooling discharge air temperature (DAT)
   4. Supply reset options
   5. Temperature alarm limits
   6. Lockout control for compressors
   7. Compressor interstage timers
   8. Night setback and setup space temperature
   9. Building static pressure
   10. Economizer changeover
   11. Current time and date
   12. Tenant override time
   13. Occupied/unoccupied time schedule
   14. One event schedule
   15. Holiday dates and duration
   16. Adjustable set points
   17. Service mode

I. If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field-selectable features. Sensor options shall include:
   1. Zone sensor with tenant override switch
   2. Zone sensor with tenant override switch plus heating and cooling set point adjustment. (Space Comfort Control systems only)

J. To increase the efficiency of the cooling system, the DDC controller shall include a discharge air temperature reset program for part-load operating conditions. The discharge air temperature

shall be controlled between a minimum and a maximum discharge air temperature (DAT) based on one of the following inputs:

1. Airflow
2. Outside air temperature
3. Space temperature
4. Return air temperature
5. External signal of 1-5 vdc
6. External signal of 0-20 mA
7. Network signal

2.16 A2L REFRIGERANT LEAK MITIGATION

A. Applies to compressorized packaged rooftop unit's refrigerant detection system (RDS) for compressorized rooftop equipment using A2L refrigerant.

B. Compressorized rooftop equipment using A2L refrigerant shall come equipped with a factory-installed Refrigerant Detection System (RDS) in compliance with UL60335-2-40. The factory-installed unit controller will respond and control the unit to comply with UL60335-2-40 according to the alarm status of the refrigerant detection system. See the unit Operations Manual for a detailed sequence of operations.

C. The Refrigerant Detection System (RDS) shall consist of the following components:
   1. Dedicated A2L Refrigerant Detection Control Board
   2. Refrigerant Sensor or Sensors. The number of sensors will vary based on the product and configuration, as needed to comply with UL requirements.

D. C. Operation and Monitoring:
   1. The refrigerant sensor or sensors communicate with the refrigerant detection control board. The refrigerant sensors detect the presence of the A2L refrigerant outside of the sealed refrigeration piping and communicate the levels to the refrigerant detection control board. The refrigerant detection controller communicates the RDS status to the factory-installed unit controller.
   2. Alarm Communication: The unit controller will communicate RDS alarms based on the RDS status in the same way as any other alarm. Alarms are triggered by the following: 1) Refrigerant detected above 15% of the refrigerant lower flammability level (LFL); 2) Refrigerant Sensor Fault.
      a. a. A customer relay is provided for the field to connect directly to the refrigerant detection control board as an alternative means to receive the above two alarm statuses.
      b. b. A customer relay is provided for the field to connect directly to the refrigerant detection control board as an alternative means to receive the above two alarm statuses.

E. Factory unit wiring diagrams must show the refrigerant leak detection system wiring.

F. To achieve a weather-tight seal between a rooftop HVAC unit and a roof curb, a sealing material must be provided for field mounting between the unit base and the roof curb.

2.17 CUSTOM ACOUSTICAL ROOF CURBS

A. Furnish and install a custom, wind-rated, isolated return air plenum, roof curb with acoustical package and duct support package by VMC (Vibration, Mountings, and Controls) model P-6200 or approved equal.

B. Supply air to get ducted down to the same location as the RTU manufacturer shows.

C. Return Air: The contractor would field cut the opening in the bottom to line up with the location shown on the drawing to clear the steel beam.

D. The panel system would be installed at the base of the curb around the duct penetrations.

E. Nominal 2" deflection.

F. BRD Package: BRD hushcore matting are installed on top of 3" to 4" of insulation as applicable. If no concrete slab is present beneath curb, installation of plenum floor on curb may be required.

Use sealant around perimeter and wherever BRD matting overlaps. Any open space left around perimeter may be filled with a square of isulation and matting.

G. Installation of Acoustical Package: Gypsum Board: Consists of angle steel welded to the inside perimeter of the curb and precut, notched cross support members. Sound attenuation is achieved with 2 layers of 5/8" thick contractor-supplied gypsum board. The contractor shall cut the gypsum board to size and install around all duct penetrations. Caulk all exposed joints.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
   1. Install rooftop units and custom roof curbs in accordance with the manufacturer's installation instructions, recommendations, and service clearances.

B. Wind-Rated Roof Curbs:
   1. Install curbs in complete accordance with the manufacturer’s printed instructions, and as indicated.
   2. Deliver roof curbs to construction contractor for installation.
   3. Coordinate roof curb placement and supply/return openings with structural engineer and structural drawings (and the sheet metal contractor).

C. Rooftop Units:
   1. Install equipment on roof curbs in complete accordance with the manufacturers’ printed instructions, and as indicated.
   2. Provide all piping, electrical and ductwork connections to equipment through roof curb openings under units.

D. Condensate Drain:
   1. Provide approved trapped condensate drain to splash block on the roof.

E. Duct Smoke Detectors
   1. Contractor shall interface return air duct smoke detectors with both fire alarm system and ATC/DDC shutdowns and alarms.

F. Electrical:
   1. Prepare for connection to electrical service. Coordinate all required electrical connections with electrical contractor.

G. ATC/DDC System:
   1. Provide interface to ATC/DDC system and any remote control points as required for a complete operating control system and sequence of operation.

H. Hot Water Piping:
   1. Provide hot water piping to hot water coil. Contractor to coordinate all valving requirements and freeze pumps with RTU manufacturer.

3.02 FIELD QUALITY CONTROL

A. Preliminary Requirements: Employ the services of a Company Field Advisor of the rooftop air conditioner manufacturer for the following:
   1. Inspect air conditioner installations prior to start-up.
   2. Supervise initial start-up of machine.
   3. Instruction of ___ Personnel.
   4. Service.

B. Pre-Start-Up, Start-Up and Instruction: Upon completion of the installation of the air conditioner, to the satisfaction of the Company Field Advisor, start-up and preliminary testing shall be accomplished under the Company Field Advisor’s supervision. When all necessary adjustments have been made and air conditioner is properly operating, the Company Field Advisor shall instruct ___ Personnel in the operation and maintenance of the air conditioner and accessories.

END OF SECTION

PART 1 - GENERAL

1.01 SYSTEM DESCRIPTION

A. The Air Conditioner or heat pump system shall be a Mitsubishi Electric split system with Variable Speed Inverter Compressor technology. The system shall consist of a horizontal discharge, single phase outdoor unit, a matched capacity indoor section that shall be equipped with a wired wall mounted, and/or wireless wall mounted controller.

1.02 QUALITY ASSURANCE

A. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL) and shall bear the ETL label.

B. All wiring shall be in accordance with the National Electrical Code (N.E.C.).

C. The units shall be rated in accordance with Air-conditioning Refrigeration Institute's (ARI) Standard 210 and bear the ARI Certification label.

D. The units shall be manufactured in a facility registered to ISO 9001 and ISO 14001.

E. A dry air holding charge shall be provided in the indoor section.

F. A pressure charge of R410A refrigerant sufficient for up to twenty-five (25) feet of refrigerant tubing shall be provided in the outdoor condensing unit.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Unit shall be stored and handled according to the manufacturer's recommendations.

B. The wireless controller shall be shipped inside the carton with the indoor unit able to withstand 105 degree F storage temperatures and 95% relative humidity without adverse effect.

1.04 WARRANTY

A. The units shall have a manufacturer's parts and defects warranty for a period five (5) year from date of installation. The compressor shall have a warranty of seven (7) years from date of installation. If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty does not include labor.

B. Manufacturer shall have over 30 years of continuous experience in the U.S. market.

1.05 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Ductless Split System Air Conditioner Product Data Submittal
      a. Submit manufacturer's product data including capacity of unit, electrical requirements, airflow, sound pressure data, indoor and outdoor unit measurements, weight, control schematics, and wiring diagrams.

PART 2 - PRODUCTS

2.01 WALL MOUNTED INDOOR UNIT

A. General
   1. The indoor unit shall be factory assembled, wired and tested. Contained within the unit shall be all factory wiring and internal piping, control circuit board and fan motor. The unit, in conjunction with the wired wall-mounted, wireless wall-mounted or wireless handheld controller, shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes shall be purged with dry air before shipment from the factory.

B. Unit Cabinet
   1. The cabinet shall be formed from high strength molded plastic with smooth finish, flat front panel design with access for filter. Cabinet color shall be white. The unit shall be wall mounted by means of a factory supplied, pre-drilled, mounting plate.

C. Fan
1. The indoor unit fan shall be high performance, double inlet, forward curve, direct drive type fan with a single motor. The fans shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings. The indoor fan shall consist of three (3) speeds. The fan shall have a selectable Auto fan setting that will adjust the fan speed based on the difference between controller set-point and space temperature.

D. Vane
1. There shall be a motorized horizontal vane to automatically direct air flow in a horizontal and downward direction for uniform air distribution. The horizontal vane shall close the outlet port when operation is stopped. There shall also be a set of vertical vanes to provide horizontal swing airflow movement.

E. Filter
1. Return air shall be filtered by means of a removable washable filter.

F. Coil
1. The evaporator coil shall be of nonferrous construction with pre-coated aluminum strake fins on copper tubing. All tube joints shall be brazed. The coils shall be pressure tested at the factory. A condensate pan and drain shall be provided under the coil.
2. A drain pan level switch, designed to connect to the control board, shall be provided and installed on the condensate pan to prevent condensate from overflowing.
3. A condensate mini-pump shall be provided to provide a means of condensate disposal.

2.02 OUTDOOR UNIT

A. General
1. The outdoor unit shall be compatible with the associated indoor unit. The connected indoor unit shall be of the same capacity as the outdoor unit.
2. The outdoor unit shall be equipped with an electronic control board that interfaces with the indoor unit to perform all necessary operation functions.
3. The outdoor unit shall be capable of cooling operation down to 0°F ambient temperature without additional low ambient controls. A wind baffle shall be provided with the unit.
4. The outdoor unit shall be completely factory assembled, piped, wired, and tested.

B. Cabinet
1. The casing shall be constructed from galvanized steel plate, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection.
2. Mounting feet shall be provided and shall be welded to the base of the cabinet and be of sufficient size to afford reliable equipment mount and stability.
3. Easy access shall be afforded to all serviceable parts by means of removable panel sections.
4. The fan grill shall be of ABS plastic.

C. Fan
1. Unit shall be furnished with a DC fan motor.
2. The fan motor bearings shall be permanently lubricated.
3. The outdoor unit shall have horizontal discharge airflow. The fan shall be mounted in front of the coil, pulling air across it from the rear and dispelling it through the front. The fan shall be provided with a raised guard to prevent external contact with moving parts.

D. Coil
1. The condenser coil shall be of copper tubing with aluminum fins. The coil shall be protected with an integral metal guard.
2. Refrigerant flow from the condenser shall be controlled by means of an electronic linear expansion valve (LEV) metering device. The LEV shall be control by a microprocessor controlled step motor.
3. All refrigerant lines between outdoor and indoor units shall be of annealed, refrigeration grade copper tubing, ARC Type, meeting ASTM B280 requirements, individually insulated in twin-tube, flexible, closed-cell, CFC-free (ozone depletion potential of zero), elastomeric material for the insulation of refrigerant pipes and tubes with thermal conductivity equal to

or better than 0.27 BTU-inch/hour per Sq Ft / °F, a water vapor transmission equal to or better than 0.08 Perm-inch and superior fire ratings such that insulation will not contribute significantly to fire and up to 1" thick insulation shall have a Flame-Spread Index of less than 25 and a Smoke-development Index of less than 50 as tested by ASTM E84 and CAN / ULC S-102.

E. Compressor
   1. The compressor for wall mounted units shall be a Frame Compliant Scroll compressor with Variable Speed Inverter Drive Technology. The compressor recessed units shall be a DC twin-rotor rotary compressor with Variable Speed Inverter Drive Technology.
   2. The compressor shall be driven by inverter circuit to control compressor speed. The compressor speed shall dynamically vary to match the room load for significantly increasing the efficiency of the system which shall result in significant energy savings.
   3. To prevent liquid from accumulating in the compressor during the off cycle, a minimal amount of current shall be automatically, intermittently applied to the compressor motor windings to maintain sufficient heat to vaporize any refrigerant. No crankcase heater is to be used.
   4. The outdoor unit shall have an accumulator and high pressure safety switch. The compressor shall be mounted to avoid the transmission of vibration.

PART 3 - EXECUTION

3.01 GENERAL

A. Install all equipment, piping, and controls in accordance with manufacturer's installation instructions.

B. Install refrigerant piping as per manufacturer's instructions and specification.

C. Mount the outdoor condensing unit on a concrete equipment pad.

D. Support the indoor unit as per the manufacturer's instructions.

E. Mount the controller. Coordinate exact location with the owner.

F. Install the drain line. Pitch drain line in the direction of flow.

G. Install new filter on indoor unit.

H. Clean all equipment after installation.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Demolition of existing electrical systems.

B. Secondary power wiring and distribution system.

C. Lighting, including lamps.

D. Wiring devices.

E. Wiring for built-in equipment.

F. Distribution panels and switches.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. All materials and equipment used in carrying out these specifications shall have UL listing and label. Specifications and drawings indicate name, type, or catalog numbers of materials and equipment to be used as standards. Proposals shall be based on these standards. Contractor may use materials and equipment equivalent to those specified, subject to Engineer's approval.

PART 3 - EXECUTION

3.01 COORDINATION

A. Carefully examine specifications, drawings and project site to be thoroughly familiar with items which require electrical connections and coordination. Electrical drawings are diagrammatic and shall not be scaled for exact sizes.

B. Notify other Contractors of any deviations or special conditions necessary for the installation of work. Interferences between work of various contractors to be resolved prior to installation. Work installed not in compliance with specifications and drawings and without properly checking and coordinating as specified above shall, if necessary, be removed and properly reinstalled without additional cost to the Owner. Engineer to be mediating authority in all disputes arising on project.

C. Equipment shall be installed in accordance with manufacturer's recommendation. Where conflicts occur between contract documents and these recommendations, a clarification shall be requested of the Engineer for decision before preceding with such work.

D. Insofar as it is possible to determine in advance, advise masonry tradesmen to leave proper chases and openings. Place all outlets, anchors, sleeves, and supports prior to pouring concrete or installation of masonry work. Should the Contractor neglect doing this, any cutting and/or patching required to be done is at this Contractor's expense.

E. FIRE ALARM – For any facilities that utilize an existing fire alarm system, the contractor shall coordinate with the owner and fire alarm monitoring company prior to removing or disabling any devices. It shall be the contractor’s responsibility to provide fire watch as per the latest addition of the Fire Code of New York State. The contractor shall provide fire watch for all areas of a facility while occupied and unoccupied when any device or part of the fire alarm system is de-activated or put into “test mode”.

3.02 CUTTING AND PATCHING

A. Repair or replace routine damage caused by cutting in performance of work under this Division.

B. Correct unnecessary damage caused due to installation of electrical work, brought about through carelessness or lack of coordination.

C. Holes cut through floor slabs to be core drilled with drill designed for this purpose. All openings, sleeves, and holes in slabs to be properly sealed, fire proofed and waterproofed.

D. Repairs to be performed with materials which match existing materials and to be installed in accordance with appropriate sections of these specifications.

3.03 TESTS

A. On completion of work, installation shall be completely operational and entirely free from ground, short circuits, and open circuits. Perform a thorough operational test in presence of the Engineer. Balance all circuits so that feeders to panels are not more than 10% out of balance between phases with all available load energized and operating. Furnish all labor, materials and instruments for above tests.

3.04 IDENTIFICATION OF EQUIPMENT

A. Properly identify the following:
   1. Distribution panels.
   2. Disconnect switches.
   3. Individually mounted circuit breakers.
   4. Relays.

B. Use permanently attached black phenolic plates with 1/4-inch white engraved lettering on the face of each, attached with two sheet metal screws.

C. Panelboard identification plates shall indicate panel by name.

3.05 INSTALLATION

A. The Contractor shall carefully move and replace existing equipment, appliances and all related items, as required to conduct proposed work.

B. Install and conduct all work per applicable NEC, State and local codes.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Shop Drawings: Indicate demolition and removal sequence and location of salvageable items; location and construction of temporary work.

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable code for demolition work, safety of structure and dust control.

B. Obtain required permits from authorities.

C. Notify affected utility companies before starting work and comply with their requirements.

D. Do not close or obstruct egress width to exits.

E. Do not turn off electric equipment without authorization from Owner.

F. Conform to procedures applicable when discovering hazardous or contaminated materials.

G. Obtain a utilities mark-out of all buried underground utilities for telephone, electric, gas, sewer and water, including all customer owned utilities of locations in auditorium where trenching will occur.

1.04 SCHEDULING

A. Schedule Work to coincide with new construction.

PART 2 - PRODUCTS

2.01 NOT USED.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify field circuiting arrangements at Port Chester Middle School.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition drawings are based on visual field observation. Report discrepancies to the Engineer before disturbing existing installation.

D. Beginning of demolition means installer accepts existing condition.

3.02 PREPARATION

A. Coordinate utility service outages with Utility Company.

B. Provide power, wiring and connections to maintain all existing power, control and telemetry systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Remove, relocate, and extend existing installations to accommodate new construction, as indicated on drawings.

B. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

D. Repair adjacent construction and finishes damaged during demolition and extension work.

E. Provide caps and filler plates/plugs for all openings in equipment and enclosures after removal of conduits.

F. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

G. Remove demolished materials from site as work progresses.

H. Completely remove and dispose of all electrical power, control, and telemetry feeds including conduits, conductors, boxes and supports not scheduled to remain after new construction is tested and operational.

I. Where existing devices and equipment are called to be removed, Contractor shall maintain circuit continuity to all existing devices and equipment remaining on that circuit. Contractor shall provide all required conduit, conductors and boxes as required.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

B. Remove temporary work.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wires and cables.

B. In general, the wires and cables included under this Section shall include, but not be limited to, the following:
   1. 600V power and control cable
   2. Communication cables

C. All conductors to be continuous from origin to panel or equipment termination without splices.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NECA Standard of Installations.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

1.04 QUALITY ASSURANCE

A. Products used in the work of this Section shall be produced by manufacturers regularly engaged in the manufacturing, installing and servicing of similar items with a history of successful production acceptable to the Engineer as specified herein and in accordance with the General Conditions.

B. Contractor shall submit the following information pertaining to the manufacturer(s):
   1. Complete literature, performance, and technical data describing the proposed equipment and listing of items made by the manufacturer.
   2. Location of closest service office from which this equipment shall be serviced.
   3. Location of closest parts inventory for item installation.

1.05 COORDINATION

A. Coordination:
   1. Coordinate wire and cable required with the equipment being furnished by others for the satisfactory operation of the equipment or system.
   2. Review installation procedures under other sections and contracts and coordinate them with the work specified herein.
   3. Notify other prime contractors in advance of the installation of the work included to provide them with sufficient time for installation and coordination of interrelated items that are included in their contracts and that must be installed in conjunction with the work included in this Section.

1.06 PROJECT CONDITIONS

A. Verify that embedded conduit, in masonry and concrete, is installed as shown on the Drawings prior to the work being enclosed by others.

B. The Contractor shall be present at all concrete pours made by the General Contractor.

C. Conductor sizes are based on copper at 75°C.

D. Wire and cable routing shown on Drawings is approximate unless dimensioned or specifically called for such as where conduit is to be embedded in concrete or masonry. Route wire and cable as required to meet project conditions and shall be routed above ceilings, directly under joists, in pipe trenches, where available, and in masonry. Where exposed conduit is permitted, it shall be run to maximize wall space.

E. Field verify destination location to determine cable routing.

F. Where wire and cable routing is not shown for proposed destination, determine exact routing and lengths required. Routing shall be reviewed with the Engineer.

PART 2 - PRODUCTS

2.01 CONDUCTORS

A. Install products in accordance with manufacturer's recommendations.

B. Single copper conductors with 600-volt insulation.

C. Minimum size of feeder conductors and grounds shall be No. 12 AWG.

D. Insulation: No. 12 AWG and No. 10 AWG, provide ANSI/NFPA 70, Type THWN-2 for interior circuits and type XHHW-2 for exterior circuits. Exterior circuits shall be considered circuits where any portion of the circuit is run exterior of the building, in which case the entire length of the circuit shall be continuous wire of Type XHHW-2.

E. Use solid conductor for feeder and branch circuits, 10 AWG and smaller.

F. All conductors shall include complete set of manufacturer's markings for insulation and conductor size.

G. Manufacturers shall be SOUTHWIRE, PRYSMIAN GROUP, OKONITE, ANIXTER or approved equal.

H. Provide white colored neutral conductors; provide black, color coded phase conductors; provide green colored ground conductors.

2.02 4-PAIR CATEGORY 6A UNSHIELDED TWISTED PAIR CABLE

A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
   1. Belden Corporation, Carmel, IN (800) 246-2673.
   2. Avaya, Basking Ridge, NJ (800) 344-02232.
   3. Berk-Tek, Incorporated, New Holland, PA (800) 237-5835.
   4. CommScope, Hickory, NC (800) 982-1708.
   5. Draka Comteq, Franklin, MA (888) 541-7100.
   6. General Cable, Highland Heights, KY (800) 424-5666.
   7. Mohawk/CDT Leominster, MA (978) 537 9961.
   8. NORDX/CDT, Worcester, MA (800) 331-0779.
   9. Superior Essex, Atlanta, GA. (800) 685-4887.
   10. Tyco Electronics, Harrisburg, PA (800) 522-6752.

B. Conductors: 4 twisted pair - 24 AWG, solid copper w/ RJ-45 connector ends
   1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is installed within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
   2. Complies with individual characteristics established in ANSI/TIA/EIA-568-B, and all addendums for Category 6 cable performance specification.
   3. Overall Nominal Diameter: .365 x .165 in.
   4. Nominal Impedance: 100 ohms plus or minus 15 percent.
   5. Certified capable of performing to minimum 350 MHz.

C. Mechanical Characteristics
   1. Operating temperature: -20°C to +80°C
   2. Bulk cable weight: 29 lbs./1000 ft.
   3. Maximum recommended pulling tension: 45 lbs.
   4. Minimum bend radius: 1 in.

D. Flame test: UL1666 Riser

E. Electrical Characteristics:
   1. Nom. Mutual Capacitance @ 1 KHz 15.0 pF/ft
   2. Maximum Capacitance Unbalance (pF/100 m) 49.2 pF/100 m
   3. Nominal Velocity of Propagation 70 %
   4. Maximum Delay (ns/100 m) 510 @ 100MHz ns/100 m

5. Maximum Delay Skew (ns/100m) 25 ns/100 m
6. Maximum Conductor DC Resistance @ 20 Deg. C 9 Ohms/100 m
7. Maximum DCR Unbalance @ 20 Deg. C 3 %
8. Max. Operating Voltage - UL 300 V RMS

2.03 MECHANICAL CONNECTORS

A. Conductor tapping connectors shall be BURNDY Servit split bolt, Series KS and KS3, or approved equal.

B. Split bolt connectors shall use BURNDY Type SC Servit cover on indoor applications.

C. Terminal lugs shall be BURNDY Universal Terminal Series. Terminal lugs shall be sized for proper ampacity and proper number of conductor holes. Each conductor shall occupy only one hole on a terminal lug.

D. Conductor tapping connectors for multiple conductors shall be BURNDY Series V-Tap with V-Tap covers, and V-Blok mounting platforms.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
   1. Make terminations in accordance with cable manufacturers instructions for the particular type of wire and cable.
   2. Splices are not allowed in the underground duct and manhole systems. If splices are required, the Contractor shall obtain approval in writing from the Engineer prior to splicing.
   3. All splices shall be in made in terminal boxes.

B. Wire and Cable Sizes: The sizes of wire and cable shall be as shown on the Contract Drawings, or if not shown, as approved by the Engineer. Minimum size wire shall be No. 12 AWG for all power, lighting and receptacle circuits. Wires for control circuits shall be No. 14 AWG minimum. Wire for instrumentation circuits shall not be smaller than No. 16 AWG. If due to field routing the voltage drop exceeds 2.5%, the size of conductors shall be increased such that 2.5% is the maximum voltage drop incurred.

C. Number of Wires: The number of wires indicated on the Contract Drawings for the various control, indications, and metering circuits were determined for general schemes of control and for particular indication and metering systems. Coordinate wiring schemes with equipment schematics.

D. Wiring Identification: All wiring shall have a unique wire number and be labeled at both ends. Wire numbers shall correspond with the equipment terminal wire numbers. Where no wire numbers are indicated, the Contractor shall assign wire numbers. Wire numbers shall not be duplicated.

E. Cable Identification Tags: The Contractor shall furnish all labor and materials and affix in a permanent way to each cable in manholes, cable compartments and vaults, junction boxes, pull boxes and points of termination, a laminated plastic tag, bearing clearly printed, the cable number indicated on the Contract Drawings or some other approved identification number or symbol. All cables shall be temporarily tagged with its full ID number immediately after it has been pulled.

F. Wiring Supplies: Only electrical wiring supplies manufactured under high standards of production and meeting the approval of the Engineer shall be used. Friction tape shall be in accordance with ASTM D69.

G. Training of Cable: Furnish all labor and material required to train cables around cable vaults within buildings and in manholes in any outdoor underground duct system. Sufficient length of cable shall be provided in each manhole and vault so that the cable can be trained and racked in an approved manner. In training or racking, the radius of bend of any cable shall be not less than the manufacturer's recommendation. All manhole cables shall be arc and fireproofed.

H. Connections at Control Panels, Limit Switches and Similar Devices:
   1. Where stranded wires are terminated at panels, and/or devices connections shall be made by solderless lug, crimp type ferrule or solder dipped.

2. Where enclosure sizes and sizes of terminals at limit switches, solenoid valves, float switches, pressure switches, temperature switches, and other devices make 7-strand, No. 12 AWG, wire terminations impractical, the Contractor shall terminate external circuits in an adjacent junction box of proper size and shall install No. 14 AWG stranded wires to the junction box in a conduit.

I. Pulling Temperature: Cable shall not be flexed or pulled when the temperature of the insulation or of the jacket is such that damage will occur due to low temperature embrittlement. When cable will be pulled with an ambient temperature within a three day period prior to pulling of 40°F or lower, cable reels shall be stored during the three day period prior to pulling in a protected storage with an ambient temperature not lower than 55 degrees F and pulling shall be completed during the work day for which the cable is removed from the protected storage.

J. Color Coding:

1. Conductor jacket shall be color coded as follows:

AC POWER

208Y/120 Volt 3 phase (NEC)
Phase A Black
Phase B Red
Phase C Blue
Neutral White
Ground Green

2. Equipment Ground - GREEN

3.02 IDENTIFICATION

A. Identify wire and cable under provisions of Section 260553.

B. Identify each conductor with its circuit number.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 014500.

B. Inspect wire and cable for physical damage and proper connection.

C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

D. Field Testing:

1. Wires and cables shall be tested before being connected to motors, devices or terminal blocks.
2. If tests reveal defects or deficiencies, the Contractor shall make the necessary repairs or shall replace the cable as directed by the Engineer, without additional cost to the Owner.
3. All tests shall be made by and at the expense of the Contractor who shall supply all testing equipment.

E. Continuity Tests: All cables, wires and shields shall be tested for continuity. Testing for continuity shall be by test light or buzzer.

F. Insulation-Resistance Tests:

1. 600V power and control cables and wires shall be tested for their insulation-resistance values. Test shall utilize a megohmmeter with applied voltage to be 1000VDC for one (1) minute. Insulation-resistance test shall be performed on each conductor with all other conductors grounded. The resistance value shall be 20 megohms or greater.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Grounding electrodes and conductors.

B. Equipment grounding conductors.

C. Bonding.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

1.03 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 COMPONENTS

A. Ground clamps:
   1. OZ ELECTRICAL MANUFACTURING COMPANY, Type "CG" for connection to water main piping and Type "GC" for connection to ground rod; with cable installed parallel or 90 degrees to pipe/rod under separate clamp.
   2. Or equal by STEEL CITY or APPLETON

B. Raceways, conductors, outlet boxes, pull and junction boxes to be furnished in accordance with applicable sections of these specifications.

C. Wire: Copper, sized to meet NFPA 70 requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
   1. Clean all conductive surfaces on equipment to be grounded, to assure good electrical continuity.
   2. Effectively bond all grounding conductors to grounding rod electrodes, equipment enclosures and ground busses.
   3. Locate all grounding attachments away from areas subject to physical damage. Provide protective covering as required.

B. Feeder/Branch Circuits:
   1. All circuits shall have a separate green grounding conductor in conduit sized in accordance with NFPA 70. Minimum size of conductor shall be No. 12 AWG.
   2. Flexible conduit will not be approved as achieving continuity of ground. All flexible conduit to have a jumper wire sized to ampacity of branch breaker and to be connected to conduit system on both ends; this applies to fixtures, motors, controls, etc.

C. Transformers:
   1. Transformers shall be grounded and grounding conductors and conduits sized in accordance with NFPA 70.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. System of supporting devices and hangers for support or bracing for conduit, electrical equipment, safety switches, fixtures, panelboards, outlet boxes, junction boxes and cabinets.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

1.03 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 EQUIPMENT REQUIREMENTS

A. Provide appropriate corrosion-resistant supporting devices and hangers for electrical equipment, as manufactured by ERICO PRODUCTS, INC., CADDY FASTENERS, STEEL CITY, MINERALLAC or equivalent.
   1. "Z" purlin clips.
   2. Conduit clips.
   3. Beam clamps (universal and vertical flange).
   4. Beam clamps (set screw type).
   5. Combination push-in conduit clips.
   6. Combination conduit hanger clamps.
   7. Flexible conduit clips.
   8. Special combination conduit clips.
   9. One hole steel straps.
   10. Conduit hangers.

B. Provide materials, sizes and types of anchors, fasteners and supports to carry the loads of equipment, wire in conduit and conduit.

2.02 CHANNEL SUPPORT SYSTEM

A. Channel systems and supports shall be manufactured by KINDORF/THOMAS & BETTS, or approved equal.

B. Channels and all associated accessories and bolts shall be hot dipped galvanized.

C. Provide end caps for all channels.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Secure conduits to within 3 feet of each outlet box, junction box, cabinet, fitting, etc., and at intervals not to exceed 10 feet in accordance with currently effective edition of the National Electric Code.

B. In seismic zones, support conduits 1 inch and smaller at 6 foot intervals.

C. Install clamps secured to structure for feeder and other conduits routed against structure. Use drop rods and hangers to support conduits run apart from the structure.

D. Provide and install suitable angle iron, channel iron or steel metal framing with accessories to support or brace electrical equipment including safety switches, fixtures, panelboards, etc.

E. Paint all supporting metal not otherwise protected, with rust inhibiting primer and then with a finish coat if appropriate to match the surrounding metal surfaces. Prepainted or galvanized support material is not required to be painted or repainted.

F. Do not use chains, perforated iron, baling wire or tie wire for supporting conduit runs. Use of clips to support conduit to top of t-bar ceiling grid will not be permitted.

G. Obtain permission from Engineer before drilling or cutting structural members.
H. Install surface mounted cabinets and panelboards with a minimum of four anchors.
I. Do not fasten supports to pipes, ducts, mechanical equipment and conduit.
J. Install products in accordance with manufacturer's instructions.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Conduit system with associated couplings, connectors and fittings. Conduits to be mechanically and electrically continuous from outlet to outlet and from outlets to cabinets, pull or junction boxes.
   1. Conduit Use - Rigid Galvanized Conduit:
      a. All exterior circuits above ground.
      b. All circuits concealed in CMU walls.
   2. Conduit Use - Electrical Metallic Tubing (EMT) Conduit:
      a. All interior circuits above ground.
   3. Conduit Use - Metal Clad (MC) Cable:
      a. All 15 and 20 amp branch circuits concealed in walls or ceilings.
   4. Conduit Use - Flexible Liquid-tight Metal Conduit:
      a. Connecting motors, generators and other equipment subject to vibration, maximum length - 3 feet.
      b. Passing through building expansion joints.
   5. J-Hooks
      a. For use above finished ceilings for CAT 6 data and fire alarm cable only.

B. Device Boxes: Provide each fixture switch, receptacle and other wiring device with a box of appropriate size and depth for its particular location use unless indicated otherwise.

C. Pull boxes, junction boxes and wire troughs

1.02 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

B. ANSI/NFPA 70 - National Electric Code.

C. NECA Standard of Installation.

D. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

E. NEMA TC 3 - PVC Fittings for use with Rigid PVC conduit and tubing.

F. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.

G. ANSI/NEMA OS1 - Sheet-steel outlet boxes, device boxes, covers and box supports.

H. NEMA 250 - Enclosures for electrical equipment (1000 volts maximum).

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Shop Drawings, prior to start of work:
   1. Prior to equipment submission, submit a list of proposed manufacturers with the products they produce proposed for the contract.
   2. Manufacturer’s catalog cuts for the conduit, boxes, fittings and supports proposed for use.
   3. Construction details of conduit racks and other conduit support systems with seismic restraint details and calculations signed by a licensed Engineer.
   4. Scaled working drawings in electronic format (AutoCAD 2020 or earlier, Revit 2020 or earlier, PDF) showing proposed routing of all conduits, inclusive of conduits routed above grade on exterior support structures, embedded in structural concrete and conduits directly buried in earth. Drawings shall show locations of pull and junction boxes and all penetrations in walls and floor slabs.
   5. Contractor shall not proceed with the installation of materials until all the above is submitted, reviewed, and approved.

1.04 REGULATORY REQUIREMENTS

A. Furnish products listed and classified by Underwriters Laboratories, Inc.

B. Conform to requirements of ANSI/NFPA 70.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 017839.

B. Accurately record actual routing of all conduits.

1.06 FIELD SAMPLES

A. Provide under provisions of Section 014500.

B. Provide field sample of conduit two each at 2 feet in length.

C. Provide field sample of expansion/deflection fitting, two each.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect, and handle products in accordance with manufacturers' recommendations.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing abovegrade. Provide appropriate covering.

1.08 PROJECT CONDITIONS

A. Verify all conduit routings by field measurements.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system. Provide all required sweeps, boxes and fittings.

PART 2 - PRODUCTS

2.01 RIGID GALVANIZED CONDUIT

A. Rigid conduit shall be hot dipped, galvanized, or electro-galvanized steel by Wheatland, Triangle, Republic or approved equal.

B. Associated couplings, connectors and fittings shall be as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO., EFCOR or approved equal. Catalog numbers used below are those of THOMAS & BETTS CORP. based on 3/4-inch size and are considered standards by which equivalents are to be judged.

C. ERICKSON couplings, Series 676 or approved equal, shall be used where neither length of conduit can be rotated.

D. Conduit connectors shall be threaded type. Set screw and compression type connections ARE NOT acceptable.

E. Sealing fitting locknuts shall be Series 142SL.

F. Steel or malleable iron insulated bullet hub, Series 370-379, complete with sealing "O" ring. DO NOT use "die cast" material.

G. Entrance ells shall be Series 1491 or approved equal.

H. Combination coupling shall be Series 531 for connecting rigid galvanized conduit to electrical metallic tubing.

2.02 ELECTRICAL METALLIC TUBING (EMT)

A. Electrical metallic tubing shall be WHEATLAND, TRIANGLE, REPUBLIC, or approved equal.

B. Associated couplings, connectors and fittings shall be as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO., EFCOR, or approved equal. Catalog numbers used below are those of THOMAS & BETTS CORP. based on 3/4-inch size and are considered standards by which equivalents are to be judged.

C. EMT connectors shall be TC-2125C compression type with threaded locknut. Set screw connectors will not be acceptable.

D. EMT couplings shall be TK-2125C compression type. Set screw connectors will not be acceptable.

2.03 METAL CLAD CABLE (MC)

A. Metal clad cable shall be manufactured by BICCGENERAL or approved equal.

B. Associated couplings, connectors and fittings shall be as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO., EFCOR or approved equal.

C. Conductors shall be types THHN and THWN. Ground wire shall be sized as per NEC with green THHN/THWN insulation. All conductors shall be cabled and wrapped in polyester tape. All conductors shall be rated for 600 VAC.

D. Armor material shall be Aluminum Interlocked Armor.

E. MC Cable shall be rated for use in air plenums.

2.04 J-HOOKS

A. TO BE USED ABOVE FINISHED CEILING ONLY. FOR TELEPHONE, PA, CAT 6 DATA AND FIRE ALARM CABLE ONLY. ALL EXPOSED CAT 6 DATA AND FIRE ALARM CABLE SHALL BE IN CONDUIT.

B. Erico Caddy HP J. Hook Series or approved equal.

C. Provide wire retainers for all.

D. Provide mounting hardware and accessories as required.

E. Spacing of J-Hooks and supports shall not exceed 5’-0” on center.

2.05 FLEXIBLE LIQUID-TIGHT METAL CONDUITS AND FITTINGS

A. Liquid-tight flexible metal conduit shall be ANACONDA or approved equal.

B. Description: Interlocked steel construction with PVC jacket.

C. Provide flexible liquid-tight conduits and fittings as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO. or approved equal. Catalog numbers used below are those of the THOMAS & BETTS CORP., based on 3/4" size and are to be considered as standards by which equivalents are to be judged. All conduit shall be liquid-tight flexible type, UL type UA, or suitable for exposure to continuous or intermittent moisture.

D. Flexible liquid-tight connectors shall be Series 5333 or approved equal.

2.06 OUTLET AND DEVICE BOXES

A. Acceptable Manufacturers: Raco, General Electric or approved equal.

B. Sheet Metal Outlet Boxes - All concealed boxes shall be NEMA OSI, galvanized steel:
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported. Provide 1/2" male fixture stubs where required.

C. Concrete Ceiling Boxes: Concrete type.

D. Cast Boxes: All exposed surface mounted boxes shall be NEMA FB1, Type FD, cast feralloy. Provide gasketed cover by box manufacturer.

2.07 JUNCTION BOXES

A. Acceptable Manufacturers: RACO, GENERAL ELECTRIC or approved equal.

B. Sheet metal boxes: NEMA OS1, galvanized steel.

C. Covers: Galvanized steel.

2.08 WIRE TROUGH

A. Wireways shall be manufactured by Square D, Class 526, rain tight trough or approved equal.

B. Wireway shall be completely enclosed with removable covers.

C. Construction: 16 Gauge Galvanized Steel. 8-inch and 12-inch wire trough shall be 14-gauge galvanized steel.

D. Finish: ANSI-49 epoxy paint applied by cathodic electro-deposition paint process over a corrosion resistant phosphate preparation.

E. UL listed.

2.09 ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT THREAD COMPOUND

A. KOPR-SHIELD or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION OF CONDUITS

A. Minimum size of conduits shall be 3/4-inch.

B. Minimum conduit depth shall be 24" below grade, measured to the top of the conduit on exterior underground installations.

C. Conduit joints shall be cut square, threaded, reamed smooth, and drawn up tight so conduit ends will butt in couplings, connectors and fittings.

D. All threaded conduits and fittings shall have KOPR-SHIELD compound applied to all threads prior to assembly.

E. Make bends or offsets with standard ells or field bends with an approved bender.

F. Run concealed conduits in direct line with long sweep bends or offsets. Run exposed conduits parallel to and at right angles to building lines. Group multiple conduit runs in banks.

G. Secure conduits to all boxes and cabinets with double locknuts and bushings so system will be electrically continuous from service to all outlets.

H. Install conduit in accordance with NECA Standard of Installation.

I. Cap ends of conduits to prevent entrance of water and other foreign material during construction.

J. Complete all conduit systems before pulling conductors.

K. Support conduits under provisions of Section 260529.

L. Provide approved expansion joints or fittings and bonding jumpers where conduits in concrete pass through building expansion joints.

M. Provide cable supports in conduits rising vertically in accordance with the National Electric Code, Article 300-19.

N. Provide No. 12 AWG copper pull wires or nylon cord in all empty conduits. Steel wire not acceptable as pull wire.

O. Install conduit to preserve fire resistance rating of partitions and other elements.

P. Ground and bond conduit under provisions of Section 260526.

Q. Where neither length of conduit can be rotated, ERICKSON couplings Series 676 shall be used.

R. In areas where enclosed and gasketed fixtures and weatherproof devices are specified, where rigid conduit enters a sheet metal enclosure, junction box and outlet box, and not terminated in a threaded hub, a steel, or malleable iron nylon insulated bullet hub, complete with recessed sealing "O" ring, shall be used, Series 370-379 . DO NOT use die cast material.

S. Conduits shall not be installed within concrete slabs unless specifically noted in contract documents; no exceptions.

T. Where conduits running overhead pass through building expansion joints, install flexible liquid tight conduit of same size with sufficient slack to allow conduits on either side of expansion joint to move a minimum of 3-inches in any direction. Provide supports as required on each side of expansion joint, all in accordance with seismic requirements of specific area.

U. Failure to route conduit through building without interfering with other equipment and construction shall not constitute a reason for an extra charge. Equipment, conduit and fixtures shall fit into

available spaces in building and shall not be introduced into building at such times and manner as to cause damage to structure. Equipment requiring servicing shall be readily accessible.

V. Arrange supports to prevent misalignment during wiring installation.

W. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

X. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.

Y. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

Z. Do not attach conduit to ceiling support wires.

AA. Arrange conduit to maintain headroom and present neat appearance.

BB. Route exposed conduit parallel and perpendicular to walls.

CC. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

DD. Maintain adequate clearance between conduit and piping.

EE. Maintain 12-inch clearance between conduit and surfaces with temperatures exceeding 104°F (40°C).

FF. Bring conduit to shoulder of fittings; fasten securely.

GG. Use conduit hubs with sealing locknuts to fasten conduit in damp and wet locations.

HH. Install no more than equivalent of three 90-degree bends on interior locations between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2-inch size.

II. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

JJ. Do not use dissimilar strap or clamp supports. Provide dielectric tape, fittings, straps, and bushings where dissimilar metals are used.

KK. Where fittings for liquid-tight flexible conduit are brought into an enclosure with a knockout, a gasket assembly, consisting of one piece "O" ring, with a Buna-R sealing material, Series 5200, shall be installed on outside of box. Fittings shall be made of either steel or malleable iron only, and shall have insulated throats or insulated bushings.

LL. A copper ground wire sized in accordance with NEC shall be installed on the inside of the conduit as a jumper around flexible conduit to assure a continuity of ground.

MM. Install a copper jumper across all flexible conduit including lighting fixtures, controls and other utilization equipment.

NN. Install liquid-tight flexible conduit in such a manner as to prevent liquids from running on surface toward fittings.

OO. Allow sufficient slack conduit to reduce the effect of vibration.

PP. Complete all conduit systems before pulling the conductors.

QQ. Support in accordance with requirements of National Electric Code.

3.02 INSTALLATION OF BOXES

A. Install boxes concealed in finished walls.

B. Locate boxes to prevent moisture from entering or accumulating within them.

C. Support boxes independently of conduit, as required by the National Electric Code.

D. Provide 4" x 1-1/2" octagonal, 4" x 1-1/2" square or 4" x 2-1/8" square ceiling outlet boxes.

E. All boxes, conduit bodies, and handholes shall be installed in a manner which meets the accessible and readily accessible reuirements of the NEC, including in building with suspended ceilings and hold down clips.

F. Where required to hang a specific fixture, provide a fixture stud of the no-bolt, self-locking type on ceiling outlets.

G. Provide 2-1/2" x 3-3/4" one gang masonry boxes for switches and receptacles installed concealed in concrete block walls. For increased cubic capacity, provide 3-1/2" x 3-3/4" one gang masonry boxes. Where more than two conduits enter the box from one direction, provide 4" square boxes with square cut device covers not less than 1" deep specifically designed for this purpose. Use round edge plaster rings only if the block walls are to be plastered. Use sectional or gang-type outlet boxes only in drywall construction.

H. Provide 4-11/16" square outlet boxes with square cut device corners for block walls or round edge plaster rings for plastered walls for telephone outlets. Single gang device boxes are not acceptable.

I. Provide fittings with threaded hubs for screw connections and with the proper type covers for switches and receptacles served by exposed conduit. Use pressed steel outlet only for ceiling fixture outlets.

J. Provide condulets with threaded hubs and covers and with proper configurations for all changes of direction of exposed conduits. Standard conduit ells may be used if they do not interfere or damage or mar the appearance of the installation.

K. Use boxes of sufficient cubic capacity to accommodate the number of conductors to be installed, in accordance with the National Electric Code.

L. Effectively close unused openings in boxes with metal plugs or plates.

M. Set boxes so that front edges are flush with finished surfaces.

N. Support boxes from structural members with approved braces.

O. Install blank device plates on outlet boxes left for future use.

P. Provide bushings in holes through which cords or conductors pass.

Q. Install boxes so that the covers will be accessible at all times.

R. Electrical boxes may be installed in vertical fire resistive assemblies classified as fire/smoke and smoke partitions without affecting the fire classification, provided such openings occur on one side only in each framing space and that openings do not exceed 16 square inches. All clearance between such boxes and the gypsum board shall be completely filled with joint compound or approved fire-resistive compound. The wall shall be built around outlet boxes larger than 16 square inches so as not to interfere with the wall rating.

3.03 INSTALLATION OF PULL BOXES, JUNCTION BOXES AND WIRE TROUGHS

A. Provide junction boxes as shown on Drawings and otherwise where required, sized according to number of conductors in box or type of service to be provided. Minimum junction box size 4-inch square and 2-1/8-inches deep. Provide screw covers for junction boxes.

B. Install boxes in conduit runs wherever necessary to avoid long runs or too many bends. Do not exceed 100-foot runs without pull boxes. Install pull boxes at all 90-degree bends.

C. Rigidly secure boxes to walls or ceilings. Conduit runs will not be considered adequate support.

D. Install boxes with covers in accessible locations. Size boxes in accordance with the National Electric Code.

E. Do not install pull boxes or junction boxes for joint use of line voltage and signal or low voltage controls unless all conductors are insulated for the highest voltage being used in the same box.

F. Coordinate installation of exterior pull boxes with General contractor to establish elevations of finished grades and pavements. All castings shall have chimney adjustment of + 6”.

3.04 CONDUIT LOCATIONS

A. Route all conduit concealed in walls or above finished ceilings. Provide boxes and conduits concealed in walls for all power and controls.

B. Surface mounted conduits will only be allowed in existing electrical rooms. Surface mounted conduits shall only be permitted for vertical runs. All horizontal runs shall be installed above finished ceilings.

C. Surface mounted raceway (wiremold) conduit will only be allowed on finished block walls or on plaster walls, where conduit cannot be run concealed. All horizontal runs shall be installed above finished ceilings, where drop ceilings are located.

D. All conduit shall be primed and painted to match existing adjacent wall color. Conduits ran overhead in auditorium and on stage shall be painted to match ceiling.

E. J-Hooks are only permitted to be used above finished ceilings for CAT 6 data and fire alarm cable.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Nameplates and labels.

B. Wire and cable markers.

C. Conduit markers.

1.02 REFERENCES

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

A. Submit under provisions of Section 013300 - SUBMITTALS.

B. Product Data: Provide catalog data for nameplates, labels and markers.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Underwriters Laboratories, Inc. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.04 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, white letters on black background.

B. Locations:
   1. Distribution panelboards.
   2. Disconnect switches.

C. Letter Size:
   1. Use 1/4 inch (6 mm) letters for identifying all control pilot lights.

D. Labels: Embossed adhesive tape, with 3/16” (5mm) white letters on black background. Use for identifying existing equipment, distribution panels, switchboards, disconnect switches, and individual electrical devices.

2.02 WIRE MARKERS

A. Manufacturers:
   1. 3M ELECTRICAL SPECIALTY DIV., Product Scotch Code.
   2. THOMAS & BETTS CORP., Product E-Z Code.
   3. Substitutions shall be permitted only after receiving written approval from the Engineer.

B. Description: Epoxy film tape type wire markers.

C. Locations: Each conductor at panelboards, auxiliary gutters, pull boxes, outlet and junction boxes, circuit breakers and each load connection.

D. Legend:
   1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
   2. Control Circuits: Control wire number indicated on interconnection diagrams on drawings.

2.03 CONDUIT MARKERS

A. Manufacturers:
   1. THOMAS & BETTS CORP.
   2. Substitutions shall be permitted only after receiving written approval from the Engineer.

B. Description: Self-sticking vinyl; black letters on orange background.

C. Location: Furnish markers for each conduit longer than 6 feet (1.8 m).

D. Spacing: 20 feet (6 m) on center.

PART 3 - EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.02 APPLICATION

A. Install nameplate and label parallel to equipment lines.

B. Secure nameplate to equipment front using screws, rivets or adhesive.

C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.

D. Apply conduit markers at 20 foot (6 m) intervals.

E. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches (75 mm) below finished grade.

3.03 ELECTRICAL EQUIPMENT IDENTIFICATION

A. The Contractor shall identify all existing circuits in existing distribution panels, switchboards and disconnect switches to remain.

B. Label all circuits identifying the load served including all individual circuit breakers.

C. Label all new circuit breakers and switches used for new feeder and branch circuits.

D. Contractor shall furnish a minimum of 5 custom engrave three-layer laminated plastic labels with up to 20 words per label as directed by the engineer/owner in addition to the required labels for all pilot devices, switches, controls and timers.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Distribution panelboards.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NECA Standard of Installation.

C. NEMA AB1 - Molded Case Circuit Breakers.

D. NEMA PB1 - Panelboards.

E. NEMA PB1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

F. NEMA ICS2 - Industrial Control Devices, Controllers and Assemblies.

G. NEMA KS1 - Enclosed Switches.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, and circuit breaker arrangement and sizes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. New Panelboards
   1. Panelboards shall be manufactured by Square D.
   2. Approved equal.

2.02 PANELBOARD REQUIREMENTS

A. Provide panelboards of circuit breaker, dead-front safety type, UL labeled, and meeting all applicable requirements of the National Electrical Manufacturers Association.

B. Provide panelboards with lugs (both main lugs and branch circuit lugs) suitable and UL approved for both aluminum and copper conductors.

C. Provide electrically isolated neutral bars.

D. Provide separate ground bars complete with lugs or connectors on bar.

E. Provide key operated door and door lock. Door shall prevent access to operate circuit breakers.

F. Provide panelboards with sequence phased bus bars or distributed phase bussing for voltage and phase as indicated on drawings.

G. Refer to drawings for numbers of branch circuits, their ratings, number of poles, arrangements, etc.

H. Provide typed circuit directory cards.

I. Provide front filler plates for unused breaker knockouts.

J. Refer to drawings for Ratings and Features.

K. All bus bars, including ground bars shall be tin-plated copper.

L. All circuit breakers shall be bolt-on type.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Ground separate ground bars to panel boxes and to the main service entrance ground bus with a code-sized grounding conductor installed in the same conduit as the phase and neutral conductors under provisions of Section 260526.

B. Install all circuits using a common neutral bus bay in accordance with the National Electric Code. Balance all circuits to achieve not greater than 7% unbalanced neutral current in panel feeders.

C. Provide six circuit breaker handle lock-on devices for each lighting and miscellaneous power panelboard for installation by the contractor on circuits as directed by the Engineer to prevent unauthorized personnel from turning off circuits to controls, unit heaters, auto-dial alarm system, etc. Provide spare lock-on devices over to the Engineer.

D. Install panelboards in accordance with NEMA PB 1.1.

E. Install panelboards plumb.

F. Height: 6 feet (2 m) to top of panel board.

G. Provide typed circuit directory for each branch circuit panelboard. Handwritten circuit directory cards will not be accepted. Revise directory to reflect circuiting changes required to balance phase loads.

H. Provide a typed circuit directory in accordance with NEC sections 110.22 and 408.4. Circuits shall be labeled with detailed information describing the switches function and equipment location.

I. For all existing circuits terminated to a new panelboard, contractor shall trace out and update the circuit directory in accordance with NEC sections 110.22 and 408.4. Include all costs for this work in base bid.

J. Revise directory to reflect circuiting changes required to balance phase loads.

K. Provide engraved plastic nameplates under the provisions of Section 260553.

3.02 FIELD QUALITY CONTROL

A. 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.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Switches, receptacles, thermostats, device plates and other wiring devices as indicated on Drawings.

1.02 RELATED SECTIONS

A. Section 260533 - Raceways and Boxes for Electrical Systems.

1.03 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NEMA WD1 - General Purpose Wiring Devices.

1.04 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Provide manufacturer's catalog information showing dimensions, colors and configuration.

1.05 REGULATORY REQUIREMENTS

A. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 SWITCHES

A. Manufacturers: HUBBELL, BRYANT, GENERAL ELECTRIC.

B. Single pole, 20 amp, 120/277 VAC, NEMA WD-1, heavy duty, UL20.

C. Device Plate: Stainless steel.

2.02 RECEPTACLES

A. Manufacturers: HUBBELL, BRYANT, GENERAL ELECTRIC.

B. 20 amp, 125 VAC, NEMA WD-1, heavy duty.

C. 20 amp, 125 VAC, NEMA WD-1, heavy duty, ground fault circuit interrupter.

D. Duplex type.

E. Device Plate: Stainless steel.

F. Tamper-Resistant Receptacles: All receptacles in areas specified below shall be listed tamper-resistant receptacles:

1. Preshchools and elementary education facilities
2. Public assembly occupancies
3. All areas required by NFPA 70 NEC

2.03 MANUAL MOTOR RATED THERMAL SWITCH

A. Acceptable Manufacturers: SQUARE D, Class 2510, Type KG1A, Type KG2C (3-pole, 600V) or approved equal.

B. Contractor shall coordinate voltage, phase and current rating with equipment.

2.04 DATA OUTLETS

A. Provide combination telephone/data jacks compatible with RJ-45 cable connections.

B. Provide “Decora” type with matching vinyl cover plate.

C. Colors shall be selected by the Owner.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Mounting:

1. Mount all switches 46-inches above finished floor to center line of switch unless noted otherwise.
2. Mount all receptacles 18-inches above finished floor to center line of receptacle unless noted otherwise.
3. Install switches with OFF position down.

B. Polarity: Properly wire all receptacles so that the hot wire, the neutral wire and the ground wire connect to the proper terminal on all receptacles.

C. Grounding: Install all devices in boxes specified under Section 260533 and install a No. 12 green ground wire from device grounding terminal to the outlet box in accordance with the National Electric Code.

D. Install device plates on switch, receptacle and blank outlets in full contact with wall surface.

3.02 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify that each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Disconnect switches.

1.02 REFERENCES

A. NEMA KS-1 - Enclosed Switches.

B. FS W-S 865 - Switch, Box (Enclosed), Surface Mounted.

C. NEMA AB1 - Molded Case Circuit Breakers.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Include outlet drawings with dimensions and equipment ratings for voltage, capacity, horsepower and short circuit current ratings.

1.04 RELATED SECTION

A. Section 260553 - Identification for Electrical Systems.

1.05 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.01 DISCONNECT SWITCHES

A. Disconnect switches shall be GENERAL ELECTRIC, heavy-duty Type TH or approved equal.

B. 75ºC conductor ratings.

C. Ratings: 240VAC

D. Quick-break, quick-make, 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.

E. Suitable for use as service entrance equipment.

F. UL listed for Class R 200,000 RMS amps, symmetrical IC.

G. Enclosures: Refer to drawings.

2.02 MOLDED CASE CIRCUIT BREAKERS

A. Install molded case circuit breakers for Panel Main Circuit Breakers.

B. Molded Case Circuit Breaker:
   1. Manufacturer: Eaton
      a. 400Amp, 3 Pole.
   2. AIC Rating: 65,000 amperes.
   3. Thermal magnetic with interchangeable trip

C. Enclosure
   1. Manufacturer: Eaton
   2. Rating: NEMA 1 (for interior use) or NEMA 3R (for exterior use).
   3. External Throw.
   4. Suitable for Service Entrance Equipment (where applicable).

2.03 EXTRA MATERIALS

A. Provide one complete set based on number of poles of spare fuses for each fused disconnect switch. Provide to Owner.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Removed temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Provide switches/enclosed circuit breakers at locations as indicated on drawings.

D. Refer to disconnect switch schedule on drawings for ampacity ratings, fuse sizes, number of poles and enclosure ratings.

E. Install engraved nameplates on each switch and enclosed circuit breaker identifying the following:
   1. Switch designated.
   2. Load served.
   3. Power origination.

3.02 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit breaker trip ranges.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires and accessories.

B. Emergency lighting and units.

1.02 REFERENCES

A. ANSI C78.379 - Electric Lamps - Incandescent and High-Intensity Discharge Reflector Lamps - Classification of Beam Patterns.

B. ANSI C82.1 - Ballasts for Fluorescent Lamps - Specifications.

C. ANSI C82.4 - Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps (Multiple Supply Type).

D. NEMA WD 6 - Wiring Devices - Dimensional Requirements.

E. NFPA 70 - National Electric Code.

F. NFPA 101 - Life Safety Code.

G. LM-79-08, IESNA Approved Method for the Electrical and Photometric Measurements of Solid-Sate Lighting Products

H. LM-80-08, IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

C. Product Data: Provide dimensions, ratings, performance data and installation instructions.

D. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.

E. All foot candle calculations and photometrics must be provided with substitute products. Photometrics shall include a room by room analysis showing walls, room names and room numbers. Calculation points shall be 2 feet on center, measured at 30" above the floor. Maintained foot candle levels shall meet or exceed those listed in Section 2.04 of this specification. On each drawing, provide a table showing the Room Name, Room Number, Maximum Light Level, Minimum Light Level, Average Light Level, Min:Max Ratio and, IES File Model Number.

F. All substitute LED light fixtures and LED retrofit lighting kits must be Design Lights Consortium (DLC) qualified.

G. All substitute LED replacement lamps must be listed by Energy Star as Certified Light Bulbs.

1.04 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

1.05 EXTRA PRODUCTS

A. Section 017800 - Closeout Submittals.

B. LED Fixtures: At completion of installation, deliver to Owner.

1. Five (5%) percent of additional fixtures for each type specified on the light fixture schedule with a minimum of one (1) fixture.

PART 2 - PRODUCTS

2.01 LIGHTING UNITS

A. Refer to lighting fixture schedule on drawings for fixture manufacturer, catalog number, and fixture description.

B. Provide electronic energy saving ballasts. Where dimming is shown on drawings, provide dimmable type ballasts.

C. Incandescent and high intensity discharge recessed lighting fixtures are to be furnished with thermal cut outs as required by NEC.

D. All fixtures equipped with emergency battery packs shall have test light and switch accessible and visible from the room floor.
   1. Emergency battery packs shall be UL 924 listed.

2.02 LIGHTING FIXTURE NOTES

A. MOUNTING: Electrical Contractor is responsible for reviewing all mounting arrangements prior to ordering any products. Electrical Contractor is responsible for ordering all of the proper fixtures, mounting hardware and miscellaneous fasteners to complete project. Fixtures to be secured to the structure from a minimum of two points, at opposing ends of the fixture when ceiling recessed or surface mounted. Four points shall be secured where necessary for the fixture to be parallel and tight to underside of ceiling. All recessed fixtures to fit tight to ceiling to eliminate all light leaks. Trim kits, when not secured internally to fixture, shall be secured to structure at a minimum of two points.

B. MOUNTING: Prior to submitting and ordering any light fixture, Contractor is responsible for verifying adequate mounting clearances for all light fixtures that are to be recessed into a grid type ceiling. Where new ceilings are to be installed, contractor shall coordinate with ceiling installers for exact mounting heights and required mounting spaces.

C. FINISHES: All exposed portions (permanent or adjustable) of fixtures to be finished by the manufacturer in a finish as specified.

D. Fixtures shall come pre-assembled and complete with all sockets (incandescent to be spring supported), lamp ends, ballasts, transformers, fixture ends, trim rings, plates, and low density mounting kits (as required) for a complete installation.

E. LENSES:
   1. Low voltage - Tempered glass, to enclose lamp.

F. VOLTAGE: As noted on the lighting fixture schedule. Contractor is responsible for field verifying available voltage(s) and ordering fixtures, ballasts, and transformers accordingly.

G. ORDERING: It is solely the responsibility of the Contractor to order fixtures, lamps, mounting brackets and accessories so that the fixtures will be installed and operating upon Owner Occupancy opening. Contractor is responsible for all delays because of his/her lack of effort to order the products in a timely manner.

H. SHIPPING: The light fixture manufacturer shall mark the fixture type as indicated on the contract drawings and/or shop drawings on the respective carton when shipping luminaries. The Contractor shall be responsible for checking each carton immediately upon receipt for verification that fixtures are undamaged and no contents are missing. All discrepancies must be reported to shipper and manufacturer immediately; otherwise the Contractor shall be responsible for items which are lacking or damaged.

2.03 WARRANTY

A. All light fixtures shall have a 5-year manufacturer’s warranty. Warranty shall begin on date of substantial completion.

2.04 SUBSTITUTIONS

A. All substituted light fixtures shall meet or exceed the lighting levels listed below in the following areas:

1. Auditorium: 50 Fc
2. Stage: 40 Fc
3. Storage: 20 Fc
4. Control: 30 Fc
5. Equipment: 30 Fc

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install fixtures in accordance with manufacturer's instructions.

B. Mount fixtures in locations as shown on drawings and as called for in schedule on electrical drawings. Determine type of ceiling to be installed in each space from drawings and schedules and furnish fixtures suitable for the exact type.

C. Joints in fixture wiring shall be made using wire nuts, pre-insulated Scotch locks, or other approved mechanical means of connection.

D. Adjustable type fixtures shall be adjusted by the Contractor to illuminate intended area to satisfaction of the Engineer.

E. Surface fixtures in or on plastered or drywall ceilings shall be supported from pieces of support channel spanning across main support channels and shall not depend on ceilings for support.

F. Coordinate fixture locations to clear diffusers, ductwork, piping, etc.

G. Maintain integrity of enclosures on all enclosed and gasketed fixtures. Minimize number of enclosure penetrations and make such penetrations water and dust tight with appropriate gasketing and fittings.

H. Fixtures are to fit tight against construction to eliminate light leaks.

I. Recessed downlights are to be provided with adjustable mounting bars/frames for drywall or lay-in ceilings as required. Fixtures shall be securely fastened to the ceiling framing member by mechanical means such as bolts, screws, rivets, or listed clips identified for use with the type of ceiling framing members and fixtures.

J. Support recessed fixtures 2 foot x 2 foot and larger using a minimum of four independent wire hangers, one on each corner, of same gauge as ceiling suspension system supported from building structure independent of ceiling framing. Install earthquake clips to secure recessed grid-suspended luminaries in place.

K. Wall-mounted fixtures shall be mounted plumb with building lines and installed with proper box and cover hardware.

L. Surface-mounted fixtures are to cover mounting hardware. Use a canopy that is no longer than the length and width of the fixture and at a height that is no higher than required to mount the fixture absolutely vertical. Fixtures shall be plumb and shall align with building lines and with each other. Support surface mounted luminaries on grid ceiling directly from building structure. Secure to prevent movement.

M. Stem-mounted fixtures are to be mounted to be absolutely vertical or horizontal. Install suspended luminaries using pendants supported from swivel hangers or in accordance with details shown in drawings. Provide pendant length required to suspend luminaire at indicated height. Support stem-mounted fixtures directly from the building structure.

N. Install recessed luminaries using accessories and firestopping materials to meet regulatory requirements for fire rating. In fire rated ceilings, recessed luminaries must carry one-hour UL fire rating classification.

O. Install all accessories specified with each fixture. Install recessed luminaries to permit removal from below.

P. Bond products and metal accessories to branch circuit equipment grounding conductor.

Q. At completion of installation and before turning over to owner, clean and remove all dirt and smudges from all lighting fixtures including lenses, louvers and reflectors.

R. Replace LED luminaries that have failed at completion of project.

END OF SECTION 265000

CAPITAL IMPROVEMENT PROGRAM – AUDITORIUM THEATRICAL LIGHTING, STAGE RIGGING AND ASSOCIATED AV/ELECTRICAL WORK AT THE PORT CHESTER MIDDLE SCHOOL

PART 1 - GENERAL

2.01 RELATED DOCUMENTS

A. The accompanying Special and General Conditions shall apply and form a part of this section.

B. Refer to the contract drawings, graphic representations, schedules and notations showing Audio-Visual System, Theatrical Lighting System, Electrical work, and related details.

2.02 SUMMARY

A. Where noted in this document the terms “Contractor” or “Bidder” shall refer to the party responsible for the supply and installation of any and all products specified herein or in the accompanying contract drawings. The terms “General Contractor” and “Electrical Contractor” are from time to time included to describe work that is typically part of those trades, in all instances items noted shall be the responsibility of the successful Bidder together with all work and equipment specified or required for proper operation.

B. Where noted in this document the terms “Architect”, “Consultant” and “Owner” refer to organizations, individuals and their representatives as typically defined by common industry terminology.

2.03 SCOPE

A. Associated Electrical Work for AV System - The Electrical Contractor shall provide and install all conduit, junction boxes, power requirements, cable, support points etc, as noted herein and on Contract drawings and as necessary for the installation of the Auditorium AV system within the Auditorium at the Port Chester Middle School, Rye Brook, NY by the AV/Integrator Subcontractor. AV Contractor shall supply and install complete and functional new equipment in excellent working order and move or modify existing equipment as described herein and in the accompanying drawings. The system shall be complete, functional and in excellent working order as described herein and in the accompanying drawings. The combined scope of the Electrical Contractor and AV Subcontractor shall include furnishing and installing all AV equipment, back boxes, floor boxes, conduit with drag lines, specified wiring, fiber, electrical power (technical and utility), system programming, and system training. All wiring shall be in conduit. Note that all low voltage terminations associated with the AV system shall be the responsibility of the AV Subcontractor.

B. Theatrical Lighting System - The Electrical Contractor shall provide and install new lighting equipment, fixtures, control system, distribution equipment, dimming equipment, etc, as noted herein and on Contract drawings and as necessary for the installation of the Auditorium stage lighting system within the Auditorium at the Port Chester Middle School, Rye Brook, NY. The Electrical Contractor shall employ the services of a qualified, rigging certified Theatrical Contractor to perform specialty services typical of their trade. Contractor shall supply and install complete and functional new equipment in excellent working order and move or modify or interface existing equipment as described herein and in the accompanying drawings. The system shall be complete, functional and in excellent working order as described herein and in the accompanying drawings. Contractor scope shall include furnishing and installing all electronic equipment, equipment racks, back boxes, wall plates with connectors, wiring, electrical power, user training, and required system programming. The base system shall incorporate energy efficient LED house and stage lighting equipment together with dimming and relay racks to power and control the lighting system. Due to the historical nature of the facility the existing house lighting chandeliers and ceiling fixtures are to be cleaned, refurbished and upgraded to LED. The dimming and relay racks shall also power and control any portable theatrical lighting instruments used through the new distribution equipment specified. System configurations shall be via the existing programmable lighting control console and any new programmable devices furnished by the Contractor. All programming shall be done by the Theatrical Contractor under the direction of the Consultant. Theatrical Contractor’s responsibility shall include; Providing a stage plot of all lighting instruments identifying unit number, console control channel, electrical circuit number,

dimmer/relay number, RDM & DMX addressing of all lighting fixtures (stage and house lighting) and DMX channel assignments for all dimmers and relays for review and approval by Consultant and District personnel. Make necessary changes to the plot and routing assignments as requested by Consultant and District personnel; provide fixtures specified, unbox, prep, hang, focus and aim all theatrical lighting instruments (furnish and install safety cables, Edison power plugs, Powercon link cables where required and 5 pin DMX connectors and network cables as required for all instruments), Note that any vertical access equipment such as ladders and lifts shall be provided by the EC. EC shall install house lighting instruments as noted on Contract drawings and relocate as directed by the Architect any units which interfere with AV, rigging or theatrical lighting equipment. In the case of instruments with multiple DMX personalities, confer with District personnel to determine which one to assign to each instrument. Once all instruments are assigned, program the theatrical control console and all remote control devices (touch panels, door and remote stations) with presets according to requests from District personnel. Functions programmed shall include but not be limited to lighting circuit channel assignments, initial stage and house lighting presets as required, touch panel layout and password accessibility for security purposes. Include labeling of all dimmer/relay module positions to indicate circuit assignments and DMX channel assignments. Circuit number labeling of all distribution housings shall be clearly visible from floor level on the up stage side of distribution housings. Contractor shall be responsible for set-up of new or Owner furnished IOS and Android devices and thorough testing and troubleshooting to ensure complete control of all system functions when controlled by user devices loaded with the latest version of Crestron's Remote app.

C. Stage Rigging System – The Electrical Contractor's rigging certified Theatrical Subcontractor shall provide and install all rigging equipment, rigging control system, support components to attach equipment to the structural supports etc, as noted herein, on Contract drawings and all necessary hardware items for the installation of the rigging system within the Auditorium of the Port Chester Middle School, Rye Brook, NY. As part of the renovation of the theatrical rigging system the Theatrical Subcontractor (TS) shall replace designated line sets with motorized linesets where required and warrant them under the terms of the system warranty herein. All curtain tracks shall be replaced. All tracks are to be roped with new lines and all new pulleys and carriers installed for smooth and quiet operation. All trim chains, NicoPress fittings, cables and ropes shall be replaced with new. All rigging components shall be anchored into the structure using properly sized cement anchors and industry standard rigging hardware. Contractor shall furnish a sample to the Architect of the anchors to be used together with documentation showing pull out specifications and installation instructions for approval prior to installation. Wherever there is access beneath the stage, the floor block installation shall be done using through bolts that are backed with an approved steel plate beneath the stage floor assembly. Contractor scope shall include furnishing and installing all electronic equipment, equipment racks, back boxes, wall plates with connectors, wiring, electrical power, user training, and required system programming. The new stage rigging shall consist of a combination of "deadhung" and motorized line sets.

D. If applicable, any motorized linesets shall be controlled from a handheld remote control touch panel. A dedicated control receptacle shall be installed as noted on the drawings to permit ease of viewing of any lines during operation. A single touch panel and control system shall be used for all of the motorized line sets. All system programming shall be done by the Contractor under the direction of the Consultant. Functions programmed shall include but not be limited to upper and lower travel limits, presets for normal operation and service heights, travel speeds, a "dead man" type switch that must be held down for system to operate, and password accessibility for security purposes. The system shall be programmed to limit the number of simultaneously operated linesets to only one at a time. The system shall have the ability to provide end user programmability of targeted presets in addition to standard "jog" operation. Contractor shall be responsible for set-up of Owner furnished IOS and Android devices and thorough testing and troubleshooting to insure complete control of all system functions when remote control by such devices is specified.

E. In addition to the Base Contract equipment and required scope, any and all approved and accepted bid alternates that may be listed shall be incorporated into the system as though they were a part of the original Base Contract.

F. Portions of the systems may be equipped with owner furnished equipment (OFE) as noted as OFE or existing on drawings. The successful Contractor shall be responsible for safe removal of OFE devices and their integration into the new system. Following removal, all OFE devices shall be cleaned. Contractor shall vacuum out any accumulations of dust etc within the equipment and clean all mechanical controls to assure quiet electronic operation. All OFE devices shall be tested and test results shall be furnished to the Owner for review. Any problems noted during testing shall be brought to the attention of the Owner who shall determine what and if any corrective means are necessary.

G. Contractor shall be responsible for the following together with specific details noted elsewhere within specification or accompanying drawings;
   1. Furnish and install new Audio and Lighting systems according to furnished contract documentation.
   2. Provide and install all electrical power, signal wiring, control wiring, circuit breakers, conduit, junction boxes, cover plates, labeling, hardware etc required for a fully functional system. Note that all AV signal and control cables are to be installed without splices.
   3. Supply portable equipment specified that is compatible with the system's capabilities and requirements of the District.
   4. Supply, installation and proper termination of all wiring (signal, electrical and control).
   5. Refer to Division 16 Electrical section for additional Electrical specifications including specific power requirements for dimming equipment.
   6. Sealing of all wall, ceiling, and floor penetrations (new and existing) necessary for the installation of conduits, wiring or any equipment. Use approved non-hardening silicone sealant or non-hardening fire-stop material as required at all penetrations. Seal conduits at rear of auditorium to prevent moisture infiltration from basement. Utilize approved expanding firestop material as manufactured by 3M or Hilti. Regular expanding insulation foam is not acceptable.
   7. Safe installation of all equipment. During construction, Contractor shall protect floors, and the surrounding areas from falling debris or any other items that could mar the surfaces. Repair of any marks or damage to the surrounding area shall be done by the Contactor without additional cost to the District.
   8. Timely installation of all equipment to meet the scheduling requirements of the District. It shall be the responsibility of the Contractor to confirm access to the space and to coordinate with other Contractors working within the facility. Costs for any non-regular work times such as during night or weekends necessary to complete the project within the confines of the District's schedule shall be borne by the Contractor without additional claim.
   9. Contractor shall furnish all necessary scaffolding or lifts as required to safely install all equipment.

2.04 BIDDERS' RESPONSIBILITY

A. If the bidder is in doubt as to the true meaning of any part of the specifications, he may submit to the architect a written request for an interpretation (RFI) thereof. Any interpretation of the proposed documents will be made only by an addendum duly issued.

B. Should the bidder find, during examination of the contract drawings and specifications, any discrepancies, omissions, ambiguities or conflicts in or among the contract documents or be in doubt as to their meaning, he should bring all questions to the architect's attention not later than ten (10) days before the bid due date. The architect shall review all questions. Where information sought is not clearly indicated or specified, the architect will issue a clarifying addendum which will become a part of the contract.

C. Should the successful bidder propose to sublet any portion of the work, his sub-contractors must be satisfactory to the architect and owner and shall be fully approved in writing. Any Sub-Contractors shall be bound by the same terms and conditions noted herein and on the accompanying drawings as the Primary Contractor. In any case final responsibility for all work is borne by the Primary Contractor.

1. The approved Sub-Contractor shall be an authorized representative of the manufacturer of the product(s) supplied.
2. The Sub-Contractor shall submit a list of similar projects completed within the past two years to document his/her involvement in the professional sound system business.
3. The Consultant shall be the final judge of suitability of experience.

2.05 GOVERNING CODES AND AUTHORITIES

A. All work material, equipment and installation in connection with the scope of work shall comply with the requirements of the governing codes and authorities.

2.06 SUBMITTALS

A. Submit with the Bid Proposal four copies of the following:
   1. Contractor Portfolio including a listing of three major projects completed over the past two years, to include the completion date of the projects, the names and locations of the projects, the nature and scope of the work performed for each project, the approximate value of the work performed for each project and the names, addresses and telephone numbers of key persons owning, operating, designing, or bearing other responsibility for the project who can attest to the relative success of the installation.
   2. A list of any and all Sub Contractors that may be working for the Contractor during the project.
   3. A listing of test equipment presently owned and for use on this project, to include the nature of the device, its manufacturer, model number, serial number and date of its last calibration.
   4. A statement acknowledging the receipt of all addenda.
   5. A bill of materials for all items specified or proposed for this project, divided by system, to include the item's specification drawing reference and description, the item's manufacturer, model number, the quantity of each item to be furnished, and the Contractor's franchise status with the manufacturers of each item, identifying any subcontractor employed.
   6. If different or revised from design drawings in the specifications, submit copies of block diagrams showing the proposed interconnection of all equipment items. Provide written description of all differences with reasons for the changes. Deviations from the original plans and specifications can only be made by first getting written approval from the Architect and the Consultant. Without their written approval the Contractor shall furnish and install all materials as per the original drawings and specifications. Note that if substitutions are proposed during the term of the project they must be furnished in sufficient time before required to allow review by the Architect and adequate time for ordering, fabrication and delivery to the jobsite.
   7. Provide complete pricing information including a base bid price and prices for each of any Optional systems pursuant to bid pricing documentation form.

B. Submit four copies of the following within 30 days of the award of contract (these shall be referred to as the shop drawings):
   1. Whether or not different or revised from or included in the design drawings in these specifications, submit:
      a. Detailed fabrication and installation drawings using CAD software for accuracy and legibility. (shop drawings) (min. 1” = 1’-0”) Provide a 3” x 5” space on all drawings for the Consultant’s review stamp.
      b. Detailed point-to-point drawings including at least one input and one output channel of each device which shows the proposed grounding techniques to be employed. Include cable numbers and alpha-numeric patch designations as needed. These shall be the same wire number designations that will be applied to both ends of all cables. Contractor shall refer to the original Contract Drawing set as a guide in fabricating submittal and final construction drawings. Contractor’s drawings shall include cable pin out, type and gender information. Duplication of original drawings for submittal purposes is prohibited.
      c. Elevation view of all equipment racks showing the proposed locations of all rack-mounted equipment. Drawings shall be drawn in a standard architectural scale.

d. Plan and elevation drawings of any hanging acoustical or electro-acoustical devices. Show method of support, interface to building structural members and finished weight of each suspended device.
e. Catalogue cuts of all manufactured products including dimensions, performance specifications and finishes.
f. Provide written description of all differences with reasons for all changes.
g. Contractor shall submit sample screens in an electronic story board fashion that will allow complete bidirectional navigation through the flow chart to review full color pages of the touch panel screens before implementation. These shall be included as part of the submittal process to be reviewed by the Consultant & the Client. Changes to the above or to the control system programming deemed necessary by the Consultant & the Client shall be furnished by the Contractor to the satisfaction of the Consultant & the Client and without additional charges.
h. Provide approved rigging drawings sealed by a licensed Professional Engineer certifying the rigging equipment and method of attachment to the designated structural elements noted on the contract drawings.
i. AV Contractor shall coordinate with Electrical Contractor and furnish detailed conduit layout drawings for approval by AV Consultant.

2. Detailed drawings illustrating the proposed mechanical and electrical construction of all Contractor-fabricated items of equipment.
3. A preliminary outline of the systems Operating Instructions for all systems to include section and paragraph numbers and titles.
4. The successful Contractor shall be required to submit itemized pricing for all AV equipment, related hardware, accessories and mounting devices as part of their product submittal package. Itemized pricing shall include installed per foot prices for all control wires and cables.
5. Contractor's submittal package shall be provided in a timely fashion prior to ordering any equipment. The Contractor is required to provide sufficient time for the complete submittal process and lead times for all equipment. Failure by the Contractor to submit shop drawings in ample time for review shall not entitle him to an extension of contract time, and no claim for extension by reason of such default will be allowed.
6. All of the drawings, conditions, remedies, and specifications submitted by the Contractor must be reviewed and completely evaluated by the Architect, Consultant and other design professionals to verify the suitability of the item or design for the use intended. Review and approval is necessary to coordinate proper integration of Contractor's products into building systems that may be unknown to the Contractor or part of contracts with other trades. These include all structural issues, fire protection and aesthetics, among many others. The Architect, Consultants and other design professionals shall not be liable for incidental and consequential damages, directly sustained, nor for any loss caused by application of any goods not in accordance with current printed instructions or for other than the intended use whether or not the item has been specified. It is the Contractor's responsibility to see to it that all installations are done in a safe and secure manner.
7. Shop drawing review is for general conformance with the design intents of the project and general compliance with the contract documents. Contractor is responsible for compliance with the contract documents, correctness of quantities, tolerances, clearances, confirmation of job site dimensions, techniques of construction and coordination of work with other trades. Review notations do not authorize changes in the project scope or price.

C. The Contractor shall submit samples to the Consultant according to the following:
1. The Consultant shall have the right to inspect and test any components of the systems which are proposed as substitutions by the Contractor, prior to approval of those components. Contractor shall ship, prepaid by UPS, (or other carrier as agreeable with Consultant), those components as required by the Consultant. After review, the Consultant shall return the components with all shipping costs paid by the Contractor.
2. The Contractor shall submit the following samples for review prior to construction of the system. All shipping costs shall be borne by the Contractor.

a. Provide a 24" length of each type of wire and cable used labeled to identify its manufacturer, product number and where used.
b. Provide a sample faceplate showing details of finishing, engraving and receptacle mounting.

D. Submit four copies each of the following materials upon completion of the installation but before Consultant's system inspection for acceptance. Bind the information into labeled three-ring binders, separating each section with tabbed and labeled dividers. These shall be referred to as the operation and maintenance manuals. These manuals shall include all information required to install, trouble-shoot and maintain all equipment and to operate the system.
1. Technical Reference Manuals, quantity 4 (four) each to include:
a. Final rack elevations;
b. Detailed functional block diagrams which illustrate every as-built condition, identifying each equipment item by manufacturer and model number, labeling alpha-numerically all contractor-furnished controls, relays, patchbay jacks, and other similar devices and referencing these designations on fabrication drawings, patchbay details and other related instruments. Normal drawing size shall be 11”x 17” and be provided as a fold-out within the manual;
c. System operation instructions which include complete and typical procedures for operations of each device both singularly and within the system;
1) Regular user maintenance instructions complete with a statement of Contractor’s warranty and that of each manufacturer;
2) Equipment list complete with manufacturer’s name, model number, serial number, module parts list and description;
3) All manufacturers’ original instruction manuals bound in a three ring binder.
4) One (1) draft copy shall be delivered to the architect (for approval) at least one (1) week prior to the consultant's site inspection.

2.07 SCHEDULING AND SUPERVISION

A. All on-site coordination and supervision of installing personnel shall be performed by a Foreman with at least three years experience supervising construction tradesmen and, where applicable, he should be affiliated with the proper construction trade union local.

B. The Contractor's project Foreman shall attend all job-site coordination meetings and shall participate in the resolution of scheduling and other matters within the Contractor’s specific trade and/or requiring coordination with other trades.

C. Furnish an emergency telephone contact number through which the Contractor's Engineer can be reached in the absence of the Foreman during normal construction work hours.

2.08 FINISHES

A. All equipment shall be installed without marring or scratches. Any equipment found to be marred or scratched shall be rejected and Contractor shall replace without charge to the District.

2.09 PERMITS AND INSPECTIONS

A. Obtain and pay for: Federal, County and Municipal inspections and permits and make such tests as called for by the regulations of such authorities. These tests shall be made in the presence of authorized representatives of the authorities concerned. Such tests shall also show proper operation of all safety devices.

B. Damage to dimming equipment due to testing procedures, or damage to the building and its services, caused by failure of any part of the electrical or dimming equipment to operate properly, shall be made good or replaced, as directed by, but with no cost, to the District.

C. Furnish all labor, material and instruments necessary for required tests. Power for testing shall be provided by the Electrical contractor or Owner.

2.10 WARRANTY

A. The system warranty shall include the following:

1. Guarantee to repair or replace any defects in materials, workmanship or performance of the installed systems or their comprising elements at no additional cost to the Owner during the warranty period.
2. Provide temporary replacement equipment of a similar nature if repairs to the defective item cannot be completed within 24 hours. Use temporary labels to match the original labeling nomenclature. Replace the temporary item with the original unit after repair.
3. Replace any equipment item which exhibits similar failures three times within the warranty period, with a new unit of the same make and model.
4. Exempt from the warranty any damage or failure caused by obvious abuse or vandalism.
5. The warranty shall remain in effect for a period of two years from the date of system acceptance except for equipment items whose manufacturer's warranties exceed this warranty period. These manufacturer's warranties shall remain in effect beyond the two-year system warranty period. The Contractor shall submit a schedule of all manufacturer warranties covering parts and labor for the equipment supplied.
6. Respond with remedy to requests for service within 24 hours of the request. Provide the Owners representative with a telephone number with which service requests can be placed at any time.

2.11 QUALIFICATIONS

A. Bids will only be accepted from Contractors that are authorized representatives of the manufacturers of the products specified and whose primary business is the installation of sound reinforcement systems.

B. In the case of any audio visual requirements, Contractor shall maintain a staff of full time factory trained installers and technicians with CTS or CTD Avixa certification.

C. Theatrical rigging and lighting equipment is to be provided to installing contractor by a qualified Theatrical Systems Integrator (TSI). The TSI shall coordinate delivery schedules and installation of equipment with Electrical Contractor. Additionally, the TSI shall be responsible for all documentation for equipment in this section, system record drawings, final testing of the system and training of the Owner’s personnel as required by this specification. System products shall include but are not limited to the following: Dimming/Power Control Equipment, Lighting Control Consoles and Data Distribution equipment, Theatrical Lighting Fixtures, Dead-Hung or Motorized Rigging Equipment, and Stage rigging/lighting accessories. The TSI shall have experience in the operation and installation of similar equipment associated with the construction and/or renovation of facilities similar in scope to this project. The TSI shall have been in business for a minimum of 10 consecutive years with no history of bankruptcy

D. Rigging shall be performed by Contractors that are licensed and certified riggers whose primary business is the installation of rigging systems and hanging of acoustical and non-acoustical entities. All rigging is to be done according to standards set forth by the United States Institute of Theatre Technology (USITT) and carried out under the direct supervision of PLASA – Entertainment Technician Certification Program (ETCP) Arena and Stage licensed and certified riggers.

E. Together with their bids contractors are required to submit a list of at least three similar projects, within forty (40) miles, that were completed within the past two years. (Refer to Section 1.06 "Submittals")

F. No Sub-Contracting shall be authorized unless the Sub-Contractor is approved by the Owner and Architect. All terms of this specification shall apply to approved Sub-Contractors based on the following criteria:
   1. The approved Sub-Contractor shall be an authorized representative of the manufacturer of the product(s) supplied.
   2. The Sub-Contractor shall submit a list of similar projects completed within the past two years to document his/her involvement in the professional sound system business.
   3. The Consultant shall be the final judge of suitability of experience

2.12 BASIS OF BIDS

A. The Bidder must submit a single total price in accordance with bidding form for all equipment, labor and delivery costs for the Basic System(s). Prices for each Optional/Alternate System shall be itemized additions to the Basic System price. Failure to comply may be cause for rejection. No segregated Proposals or assignments will be considered unless specifically called for herein.

2.13 PERFORMANCE REQUIREMENTS

A. Provide all equipment, materials and labor to fabricate, assemble, mount, terminate, test, adjust, document and warrant the systems described in these specifications and on the accompanying drawings and demonstrate proper operation and maintenance to the Consultant as well as to personnel operating the equipment through training sessions as detailed in the Training section herein.

B. All systems shall be complete, (including any materials, fittings and accessory equipment not specifically enumerated in these specifications or shown on the drawings) to provide full functionality as described herein and on the accompanying drawings. The system and all components shall operate to the required performance levels stated or that are standard in the industry. It is understood that all necessary equipment shall be supplied complete by the Contractor without extra compensation even though not specifically mentioned herein. Confirm the availability of the equipment specified with the manufacturers. No claim for payment for additional costs incurred due to discontinued or superseded equipment or materials will be honored.

C. Install all materials in a neat and finished manner. Final appearances and finishes shall be subject to the approval of the Architect and the District's representative.

D. Confirm that all equipment furnished meets or exceeds the manufacturer's published performance standards and specifications. Provide all testing and measurements described herein.

E. Provide all documentation listed under Part 1.06, "Submittals".

F. The Contractor shall inspect the premises and verify all field conditions and all contract documents, specifications and drawings relating to this project. No claim for payment for additional costs incurred due to conditions which could have been determined by these inspections will be honored. Inspections and installation shall take place during approved job site working hours in a manner which will not interfere with other trades or the Owner’s usage of the facility.

G. Advise the Consultant of any apparent conflicts, discrepancies or omissions in these or related specifications, drawings or field conditions. Where conflicts occur, provide the greater quantity or more stringent performance level for equipment or construction methods.

H. Accompany the Consultant during inspections of the work both during the installation and following its completion. Provide documentation, test equipment, personnel lifts, safety harnesses, permanent or temporary lighting and other support services as requested for inspection.

I. System acceptance is contingent upon the Consultant's inspection and verification that all equipment has been provided and that all work, including documentation, has been completed in accordance with these specifications and related drawings. Physical inspections and measurements will be made to verify the test data results submitted. All costs for extended inspections and verifications due to installation or adjustment errors, oversights or omissions shall be borne by the Contractor.

J. The Contractor shall be liable for any costs for additional materials and/or labor required from others to fulfill the requirements of this specification and the associated drawings on schedule.

K. The owner reserves the right to use the systems prior to the acceptance without obligation to pay additional costs or to accept the commencement of the warranty period.

2.14 SYSTEM DESCRIPTION

A. Contractor shall supply and install complete and functional new equipment in excellent working order within the Auditorium of the Port Chester Middle School in Rye Brook, NY. Refer to Contract Drawings and entire specification for complete system description and Contractor scope. Note

that the following scope descriptions may contain items that are alternates to the base bids. Refer to equipment lists and bid forms for itemization of alternate items.

B. The audio visual components to be furnished and installed by the Contractor within this contract consist of the following;
   1. Loudspeakers: Remove and replace existing speakers as noted on drawings. Provide and install new speakers and hardware as noted on drawings. Colors shall be as noted in equipment list.
   2. Replace and modify existing audio video systems as noted.
   3. Provide an audio and video feed to the Band Room/Green Room location. Interface with OFE display equipment.
   4. All new audio and video wiring noted shall be run within concealed metal conduit. AV wiring within conduit running from the stage/orchestra pit area to the rear of the auditorium is to be ran above and along the outer edge of the house ceiling in a manner not visible from the seating area. Any sections which must span across open ceiling areas shall be painted black and kept to a minimum. Conduit and cables shall not be visible from areas open to the public. Contractor may install surface mounted conduit in backstage locations but must obtain permission from the Architect regarding the routing of conduits. Provide and install all new conduit, back boxes, junction boxes etc as noted for audio visual systems. All conduits to include safed off drag lines identified as noted on drawings. In the case of long conduit runs intermediate pull boxes are required where deemed necessary by the Architect.

C. C. The Lighting and rigging system consists of the following;
   1. Remove all existing theatrical lighting distribution strips and rigging equipment. Any existing equipment that is required to remain shall be protected during construction. Install new systems and equipment as noted on drawings. Refer to Contract Drawings for electrical requirements.
   2. Furnish and install new circuit distribution equipment as noted in equipment list and as noted on drawings. DMX control distribution shall also be included in each of the new distribution troughs. In the case of FOH hanging battens, all wiring to pass through same ceiling ring as support cables and covered by approved Flex-Mesh to match ceiling. Side and Proscenium distribution boxes to have wiring ran in conduit to each. All flying electric battens to have flexible SO jacketed feed cables supported using cable cradles connected to the rigging system in a manner that will allow them to travel in tandem with each lineset. Distribution troughs to include three pin female Edison connector pigtails for all of the new circuits. Final height and location TBD in field by Consultant.
   3. Provide and install new audience aisle lighting as noted on drawings. Coordinate installation with GC who will furnish necessary trenching.
   4. Interface new DMX/0-10V LED house lights with new lighting system.
   5. Recess existing FOH eyebrow pendant lights to be flush with the face of the ceiling cloud.
   6. Due to the sound sensitive nature of the facility, Contractor shall provide manufacturer furnished sound attenuation units for all lighting and AV equipment.
   7. Contractor to provide, terminate, hang, and program all new portable lighting instruments purchased. Aim all lights as directed by District.
   8. Provide programming of all new house and stage lighting control systems as well as any motorized rigging system. Include lighting and rigging “presets” as directed by District. Include user training as noted in Training section of specifications.

2.15 INSTALLATION STANDARDS

A. Furnish materials and perform all work in accordance with the latest revisions of all applicable codes and standards including the National Electric Code, Underwriter's Laboratories, OSHA, ANSI, National Fire Protection Association and all state and local codes. Any corrections necessary due to nonconformance with codes will be at the expense of the Contractor. The aforementioned codes and standards shall prevail in any conflict with this specification. Any such conflict shall be brought to the attention of the Consultant in writing.

B. The contractor shall supply and install audio/visual signal cables. In doing so care should be taken to see that low level audio lines (mic and line) are kept at least 12” from all AC power, speaker level and digital control lines. Only cables carrying signals of like type and voltage levels shall be run within the same conduit, support guide ring or cable tray section. Where it is necessary to cross AC power and audio lines, do so at right angles to one another.

C. Where not in conflict with the above, install the systems in accordance with the provisions shown on the Contract Drawings, contained herein and all manufacturers' recommendations.

D. Execute all wiring to the highest standards of industry and professional practice. Refer to Sound System Engineering, Forth Edition, Don Davis, Focal Press and A Clean Audio Installation Guide, Allen H. Burdick, Benchmark Media Systems, for additional installation guidelines and standards.

E. System grounding and power routing shall adhere to isolated ground conventions used for studio and broadcast installations where single isolated grounds are used for each rack device to prevent multiple ground paths or "loops". It shall be the Sound Contractor’s responsibility to confirm and correct if necessary that the technical ground has been connected to building ground at only one location with #4 AWG or larger insulated wire.

F. Provide all equipment, materials and labor to fabricate, assemble, mount, terminate, test, adjust, document and warrant the systems described in these specifications and on the accompanying drawings and demonstrate proper operation and maintenance to the Consultant and end User.

G. All software or firmware based devices shall be furnished with the latest release version of all software and firmware. Contractor is required to provide, install, and integrate any manufacturer furnished free updates without charge to the owner during the warranty period.

H. It is the contractor’s responsibility to place wireless interfaces (microphone antennae, network wireless access devices, ALS antennae, IEM antennae etc.) in a location that yields the best possible reception regardless of approximate locations shown on drawings without any additional charges to the owner. Contractor shall refer to all FCC and Free Space regulations for set up of wireless devices.

2.16 DELIVERY, STORAGE AND HANDLING

A. Schedule delivery of materials and assemblies with other related trades to eliminate installation delays. Delivery hereunder shall include unloading the vehicle and transportation to final destination within the building. Confirm all deliveries in advance with the General Contractor's on site representative.

B. Obtain secured storage areas for all materials as assigned by the General Contractor. Neatly pile and store loose materials under watertight covers. Protect all assemblies from damage, dust, moisture and excessive humidity during installation.

C. Repair or replace any materials or finishes damaged during delivery, storage or installation.

2.17 COORDINATION WITH OTHER TRADES

A. The Primary Electrical Contractor and Subcontractors shall cooperate with members of other trades in a manner that will achieve timely completion and satisfactory order.

B. The Contractor shall furnish all system conduit, pull backboxes, wire and electrical power as noted on the drawings or in this specification.

C. As a sub contractor to the Electrical Contractor the Audio Visual Contractor shall supply all AV equipment specified together with any necessary for the intended system operation, include all standard accessories, specified non-standard accessories, equipment mounts and hardware, termination and testing of AV wiring, necessary technical over sight of all AV project details, Control system programming, system software set up and customization and required Owner training. The Electrical Contractor shall furnish all system conduit, pull back boxes, junction boxes and technical electrical power to all devices whether or not noted on the drawings or in this specification. Provide marked drag lines in all installed conduits for future use. The Electrical Contractor is responsible for all cutting and patching necessary to install the new audio system. All patching shall match adjacent construction. Patching of wall penetrations to be done using non-hardening silicone caulking or fire stop material.

PART 2 PRODUCTS

3.01 GENERAL

3.02 REFERENCE STANDARDS

A. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2023, with Errata.

B. Base bids shall include all the equipment specified herein together with any necessary for the intended system operation. All of the features, functions and performance parameters of the equipment listed shall be provided whether or not fully described. All equipment shall be new and the latest production model as of the date of acceptance of the pre-award submittal.

C. The equipment listed provides the standard of quality required for this project and substitute equipment will generally not be considered unless the specified item is discontinued. For substitute equipment to be considered it must have equal or better performance characteristics and not create any necessary system redesign issues due to size, physical configuration, programming requirements or product features. In the case of substituted speakers the documentation for the proposed substitute must include EASE data showing that the performance is identical to the originally specified equipment before being considered.

D. When proposals for substitutions are submitted they will be considered only if accompanied by:
   1. Manufacturer's published literature providing a complete list of the operational characteristics and performance parameters of the proposed substitution;
   2. A complete listing of the operational and performance differences between the proposed substitution and that specified;
   3. In the case of requests for substitution of electro-acoustical transducers such as microphones and speakers the Contractor must provide samples of the substituted devices for listening tests by the Owner and the Consultant. This shall be at the expense of the Contractor and shall be in addition to testing by independent laboratories. For speaker substitution requests the Contractor shall provide Ease Data for the substituted device and the substituted devices shall only be considered if such data meets or exceeds that of the originally specified transducer.
   4. A complete listing of the changes required in related equipment or wiring, and drawings showing any wiring changes or a statement that no changes are required.
   5. A statement describing the benefits to be derived if the proposed substitution is accepted.

E. Only proposals for substitutions submitted with the base bid will be considered except in the event of discontinued products. The costs to evaluate proposed substitutions, including testing by independent laboratories, samples and other information as may be requested, shall be borne entirely by the Contractor. Evaluation of the proposals will be made solely by the Consultant and his decisions will be final. Approval of a substitute, if and when given, does not relieve the Contractor, material/product supplier, or manufacturer of any responsibility whatsoever; but rather, they jointly assume the responsibility that the material/product installed will meet or exceed the functions, intent, and performance required by the contract drawings and specifications for the life of the product. Any evidence that the approved substitute does not meet the required standards during the warranty period shall be cause for the product to be replaced with the originally specified item or an item specified by the Consultant at the sole expense of the Contractor.

3.03 MATERIALS

A. Cable Markers: Panduit or Brady custom cable label printers.

B. Receptacles:
   1. XLR, panel-mount, female: Neutrik NC3FD-L-B-1
   2. XLR, panel-mount, male: Neutrik NC3MD-L-B-1
   3. 1/4" 3-conductor, panel-mount, female: Neutrik NJ3FP6C
   4. RCA, panel-mount, female: Neutrik NF2D-B
   5. UHF/Wireless, panel-mount, female: CZ Labs 407

6. Mixer multi-pin, panel-mount, female: According to Contract Drawings
7. BNC, panel-mount: Neutrik NBB75DF1B-P

C. Connectors:
1. XLR, cable-mount, male: Neutik NC3MX-B
2. XLR, cable-mount, female: Neutrik NC3FX-B
3. 1/4" 2-conductor, cable-mount, male: Switchcraft 280
4. 1/4" 3-conductor, cable-mount, male: Switchcraft 297
5. RCA, cable-mount, male: Switchcraft 3502G
6. PL259, cable-mount, male: CZ Labs 401 with 402 reducer
7. Mixer multi-pin, cable-mount, male: According to Contract Drawings
8. BNC, cable mount: Canare BCP-C

D. Terminal Blocks for audio signal wiring.
1. Phoenix Contact MBK2.5/E and MBK5/E mounted on NS35/7.5 DIN mounting rail or Molex Beau Eurostyle terminal blocks unless otherwise specified. Note that in either case Contractor is to utilize terminal blocks properly sized for the wire specified.
2. All cables 16GA and larger shall use Molex 3910012 Series 12mm high profile terminal strips w/wire protectors and integral standoffs. Size terminal strip according to wire gauge and number of circuits and limit each terminal lug to one wire.
3. Low voltage power wiring shall use terminal blocks and connectors which are of an equal quality to the above and appropriately sized for the current and cable capacities. All terminal blocks shall be fully exposed within the rack, labeled and mounted on ¾” birch veneer plywood sealed with two coats of latex fire retardant black paint or electrically isolated mounting devices as manufactured by Middle Atlantic or Lowell.

E. Switches rotary controls and relays as required
1. Cutler Hammer, C&K, Potter&Brumfield, Ohmite and Carlingswitch.

F. Panel and Wallplate Labels
1. Unless specifically directed on the drawings or elsewhere in this specification all custom labels shall be engraved white lamacoid with a minimum of 1/10" white lettering. Submit detailed dimensioned drawings of all engravings for approval. Where custom metal plates are specified, engraved lamacoid labels are not acceptable and engraving must be done directly on the metal plate.

G. Equipment Rack
1. Unless otherwise noted all equipment racks are to be supplied with locking front and rear doors, drilled and tapped front, rear and intermediate rackrails, 19” blank panels and 19” top and bottom vent panels. A minimum of a 1RU steel blank panel shall be installed between each rack mounted device unless otherwise noted. With the exception of the isolated power ground, isolate the rack from all building grounds as required, including conduit and floor borne, to eliminate ground loops

H. Permanently Installed Cables
1. Microphone and line level cables: Belden 9464
2. Speaker cables: Belden 5000UE (non-plenum), Belden 6000UE (plenum)
3. Control cables: Belden 82723 or other similar Belden cable determined by the quantity of conductors required.
4. HDMI cables: Liberty High Speed HDS HDMI
5. Video cables: Belden
6. Snake cables: Proco Sound (sized as noted)
    a. All mixer fan outs to be labeled indicating line number and signal type (M-microphone line #, mixer line inputs and outputs to be labeled on cables and patch panel assignments that terminate to fan out to be labeled with same descriptor.) Use Neutrik gold terminal connectors. Color code cable groups with shrink tubing in a manner that permits easy identification.
7. Lighting DMX cable Liberty 24-2P-485

3.04 EQUIPMENT

A. Audio-Visual Equipment

MAJOR EQUIPMENT ITEMS
General: All AV equipment shall be furnished w/all standard accessories and rack mount kits unless specified otherwise. Wiring, receptacles, plates and other infrastructure components shown on drawings are part of the base bid regardless if the associated Alternate is or isn't accepted. Provide security covers from touch screen manufacturer for all wall mounted touch screens. Only new equipment is listed, refer to drawings for OFE,

Area Name	Quantity	Part Number	Part Description
Auditorium AV System	1	BGR-4527-AV	Pre-Configured BGR For AV Systems BGR-4527-AV
Auditorium AV System	1	MPR-9A	MPR RACEWAY,80"
Auditorium AV System	1	MPR-JB863A	MPR JBOX 8"X6"X3"
Auditorium AV System	4	M-2X20A	8"MPR 20A DOUBLE DUPLEX MODULE
Auditorium AV System	4	RLM-20A	8"MPR 20A CONTROL MODULE
Auditorium AV System	1	MPR-SEQA	8"MPR SEQUENCE CONTROL MODULE
Auditorium AV System	1	T-80X6	80 TAILS - 6 PACK
Auditorium AV System	2	GSM4230PX-100NAS	M4250-26G4XF-POE MANAGED SWITCH
Auditorium AV System	1	Prism 16x16 Dante	Programmable DSP, 16 mic/line in, 16 line out, 64x64 Dante, ARC
Auditorium AV System	1	ARC-3 Black	ARC Remote with 2 capacitive buttons, capacitve fader, OLED display, surface and wall mount options included, black

Auditorium AV System	1	xIO Bluetooth, Black, U.S.	Dante I/O Endpoint, Bluetooth media in, Bluetooth phone I/O, 4x4 Dante, PoE, Decora single gang US version, black
Auditorium AV System	1	DM7-EX	DM7 120-channel Digital Mixer CTL-DM7 Control Expansion (Items Shipped Independently)
Auditorium AV System	1	RIO3224-D2	32 x 24 I/O Rack
Auditorium AV System	1	RIO1608-D2	16 x 8 I/O Rack
Auditorium AV System	1	R5 Black	Ultra-compact 3-way precision passive loudspeaker. 2 x 5" neo LF/MF, 1.5" neo ring HF, 110° x 50°/80° x 50° rotatable, 80Hz - 20kHz, 8kg. Requires DQ Series amplifier
Auditorium AV System	1	FC-R5h Black	Horizontal flying cradle for R5
Auditorium AV System	3	R8 Black	Compact 3-way precision passive loudspeaker. 2 x 8" neo LF, 4"/2.5" neo coaxial MF/HF, 110° x 50°/80° x 50° rotatable, 70Hz - 20kHz, 23kg. Requires DQ Series amplifier
Auditorium AV System	3	FC-R8h Black	Horizontal flying cradle for R8
Auditorium AV System	3	R10 Black	3-way precision passive

			loudspeaker. 2 x 10" neo LF, 4"/2.5" neo coaxial MF/HF, 110° x 50°/80° x 50° rotatable, 60Hz - 20kHz, 31kg. Requires DQ Series amplifier
Auditorium AV System	3	FC-R10h Black	Horizontal flying cradle for R10
Auditorium AV System	2	S-12 White	Compact reflex subwoofer. 1 x 12" LF, 40Hz - 150Hz, 29kg
Auditorium AV System	2	FC-S12 Black	Flying yoke for S-12 subwoofer
Auditorium AV System	2	DQ20D	Advanced System Amplifier - Dante enabled
Auditorium AV System	As Req'd	By Contractor	Misc. Rigging Hardware (Shackles, Chain, Eyebolts)
Auditorium AV System	4	Whirlwind-WFF12X2.5	Wall Frame-13"x13"x2.5", black, fits 12"x12" reces. elect. Box
Auditorium AV System	1	By Contractor	Console Input Plate
Auditorium AV System	4	By Contractor	Custom 12" X 12" MIUD Plates
Auditorium AV System	2	SLXD124/85-G58	Combo System with SLXD1 Bodypack, SLXD4 Receiver, SM58 and WL185 Lavalier Microphone
Auditorium AV System	1	DISTRO4	4-Channel UHF Antenna Distribution System (470 to 952 MHz)
Auditorium AV System	1	LT-800-072-01-D	Stationary RF Transmitter (72 MHz) (Dante)

Auditorium AV System	1	LA-326	Universal Rack Mounting Kit
Auditorium AV System	1	LA-122	Universal Antenna Kit (72 and 216 MHz)
Auditorium AV System	28	LR-4200-072	Intelligent DSP RF Receiver (72 MHz)
Auditorium AV System	28	LA-403	Universal Behind-the-Head Stereo Headphones
Auditorium AV System	7	LA-430	Intelligent Earphone/Neck Loop Lanyard
Auditorium AV System	1	123-528	E-Vision 10000i WU
Auditorium AV System	1	112-503	3.58 - 5.38 : 1
Auditorium AV System	1	XX999-080A	Gimble Only
Auditorium AV System	1	CP4N	4-Series™ Control System
Auditorium AV System	1	TS-1070-B-S	10.1 inch (256.54 mm). Tabletop Touch Screen, Black Smooth
Auditorium AV System	2	TSW-770-B-S	7 inch (177.8 mm). Wall Mount Touch Screen, Black Smooth
Auditorium AV System	1	AC-MXNET-CBOX-HA	Control Box for MXNET System
Auditorium AV System	4	AC-MXNET-1G-EV2WP	MXnet Evolution II AV-over-IP wall plate encoder with switchable HDMI and USB-C inputs--Not Compatible with V1 Systems
Auditorium AV System	2	AC-MXNET-1G-EV2	MXNet 1G Evolution II Encoder ---NOT COMPATIBLE WITH V1 SYSTEMS
Auditorium AV System	4	AC-MXNET-1G-DV2	MXNet 1G Evolution II

			Decoder --Not Compatible with V1 Systems
Auditorium AV System	1	14187	PROFESSIONAL TNSD 283D HD1.1
Auditorium AV System	1	40973	SINGLE MOTOR LVC110VOLT WHITE
Auditorium AV System	4	C210BK1000	2C 10G STRD JACKETED
Auditorium AV System	6	25227BBK0500	1P 12G STRD UNSHLD PLENII
Auditorium AV System	4	254236FBK1000	4PR 23G SHLD CAT6 CMP
Auditorium AV System	4	254246EZSGN1000	4P 23G SLD CAT 6 PLENUM
Auditorium AV System	8	D25454BK1000	1P 22G STR B/SHLD CMP
Production Intercom	1	FSE-BASE	FreeSpeak Edge Base Station: (16) beltpacks*, 1RU with 4-wire, 2-wire with Power Supply, Dante
Production Intercom	8	FSE-BP50-X4	FreeSpeak Edge Beltpack: 5GHz with (9) assignable keys, 4 pin XLR-Male headset
Production Intercom	1	FSE-TCVR-50-IP-US	FreeSpeak Edge Transceiver: 5GHz, IP, US for (10) FSE-BP50 beltpacks
Production Intercom	2	AC80	FreeSpeak Edge Charger for (4) FSE-BP50 or BAT80
Production Intercom	8	BAT80	FreeSpeak Edge Battery for FSE-BP50
Production Intercom	9	CC-300-X4	Headset: Single Ear, Medium weight, XLR (F) 4 pin with Dynamic Mic, Boom switch.

			Inc. headset bag
Upgraded NDI Pan, Tilt, Zoom Cameras	1		CR-N700 (Black) Indoor PTZ, 4K UHD, 1" Sensor, 15x Zoom, 12G-SDI, 3G- SDI, HDMI, IP, POE
Upgraded NDI Pan, Tilt, Zoom Cameras	2		CR-N500 (Black) Indoor PTZ, 4K UHD, 1" Sensor, 15x Zoom, 3G-SDI, HDMI, IP, POE
Upgraded NDI Pan, Tilt, Zoom Cameras	3		Nigel B. Design NB-AVCB Black Finish Anti-Vibration Multi Camera Mounting Bracket
Upgraded NDI Pan, Tilt, Zoom Cameras	2	BMD-HDL-SMTWSCOPEDUO4K2	SmartScope Duo 4K 2
Upgraded NDI Pan, Tilt, Zoom Cameras	1		RC-IP100 Remote Camera Controller, 7" Diagonal Touch Screen
Upgraded NDI Pan, Tilt, Zoom Cameras	3	6450BK1000	RG6 18G HD-SDI 12Ghz 4K CMR
Upgraded NDI Pan, Tilt, Zoom Cameras	3	254346ABK1000	4P 23G CAT6A UTP CMP
Upgraded NDI Pan, Tilt, Zoom Cameras	1		Misc. Materials, Hardware, and Connectors
Video Program Streaming	1	BMD-BDLKWEBPTR4K	Blackmagic Web Presenter 4K
Video Program Streaming	1	BMD-CONVNTRM/CB/AUSDI	Teranex Mini - Audio to SDI 12G
Video Program	1	BMD-CONVNTRM/YA/RSU	Blackmagic Universal Rack

Streaming			Shelf
Lighting & Dimming System	1		Lyntec Quote Q21745
Lighting & Dimming System	1		SSRC Quote 617249
Lighting & Dimming System	1	LWR-1619	Wall Rack 16Ux19D
Lighting & Dimming System	1	LFD-16FV	Vented Door 16U
Lighting & Dimming System	1	UPSVLI-1500-1	Line Interactive UPS Lith
Lighting & Dimming System	1	GSM4230PX-100NAS	M4250-26G4XF-POE MANAGED SWITCH
Lighting & Dimming System	1		Pathways DMEXIT Emergency Controller
Lighting & Dimming System	1		Pathways 8 Port Gateway PWPP RM P8 Term Rear
Lighting & Dimming System	1		Cue Server Pro 3 - 3 Universe License
Lighting & Dimming System	1		Cue Server Hub w/ Ethernet
Lighting & Dimming System	2		Mystique 8 Button Station ST-MD8-CA-RGB
Lighting & Dimming System	7		Mystique 2 Button Station ST-MD2-CA-RGB
Lighting & Dimming System	1		Insite 7" Touch Screen
Lighting & Dimming System	4		DMX/sACN Input Plates
Lighting & Dimming System	1		ETC Ion XE 20 - 2K Lighting Control Console

			with 2048 Outputs and 20 Faders
Lighting & Dimming System	2		22" Touchscreen Monitors
Lighting & Dimming System	3	25359BGY1000	4C 20G (2S/2UN) PLEN II
Lighting & Dimming System	4	254346ABK1000	4P 23G CAT6A UTP CMP
Lighting & Dimming System	2	ETC UFMP8	8-zone 0-10V Relay Panel
Portable Lighting Equipment	6	OVATIONH605FCBLK	Ovation H-605 FC
Portable Lighting Equipment	12	OVATIONREVEE3	Ovation Rêve E-3
Portable Lighting Equipment	6	OHDLENS26	26° - Ovation Ellipsoidal HD Lens Tube
Portable Lighting Equipment	6	OHDLENS36	36° - Ovation Ellipsoidal HD Lens Tube
Portable Lighting Equipment	6	OVATIONF145WW	Ovation F-145WW Includes: powerCON Power Cord Control: 3-pin DMX, 5-pin DMX
Portable Lighting Equipment	24	OVATIONE2FC	Ovation E-2 FC
Portable Lighting Equipment	12	OVATIONP56FC-2	Ovation P-56 FC
Portable Lighting Equipment	7	OVATIONCYC3FC	Ovation Cyc 3 FC

Portable Lighting Equipment	21	OVATIONB565FC	Ovation B-565FC
Portable Lighting Equipment	30	CTC50HCBLK	Half-Coupler (Black)
Portable Lighting Equipment	122	CLP05	1-2.5in Pro Clamp
Portable Lighting Equipment	126	CH05	Safety Cable
Portable Lighting Equipment	96	IPPOWERKONEXT10FT	IP Powerkon Extension, 10 feet (304.8 cm)
Portable Lighting Equipment	96	DMX5P10FT	5-Pin 10' DMX Cable
Stage Edge Lights	1		Future-Lights 48' Edgelyte E/WA/3-/24/B-R/DX Blue LEDs 24" OC Wide Angle LDs with a red LED on the CenterLine Quarter Marks and Ends
RGBW Cove Lights	180		ESSENTIALS ARKA-FLAT (01) RGBW 24VDC Linear Fixtures - Corner & Surface - Per Foot
RGBW Cove Lights	5		QOM-eLED DMX-PS 300 24V DC Power Supply - 100W–300W
Moving Lights	3	MAVERICKFORCEXPROFILE	Maverick Force X Profile
Moving Lights	8	ROGUER3XWASH	Rogue R3X Wash
Moving Lights	12	CTC50HCBLK	Half-Coupler (Black)
Moving Lights	9	SC08	SC-08 High-Capacity Professional Safety Cable, 35", Black

Moving Lights	9	IPPOWERKONEXT10FT	IP Powerkon Extension, 10 feet (304.8 cm)
Moving Lights	8	GENETIXGN2	GeNetix GN2 - 2-Port Node
Moving Lights	8	254236FBK0500	4PR 23G SHLD CAT6 CMP
Spot Light - Parts Only	2	Altman AFS700	1000 Watt LED Followspot, Black w/ Stand
Add Tormentors and FOH Batten	4	SDT_HIW943	10" x 10' Tormentor Pipe Complete w/ Flange
Add Tormentors and FOH Batten	5	BC12-17-0	Beam Clamp, 12"-17", 1 Ton, No Eye
Add Tormentors and FOH Batten	1		P202-24 Inner Sleeve - 24” Length † (Same Bolt Hole Pattern for Standard P210)
Add Tormentors and FOH Batten	2		P210-211½” Sch 40 @ 21'-0" Stock - Black Pipe - Drilled for P202 on Both Ends
Add Tormentors and FOH Batten	5		P210-7 1½” Sch 40 @ 7'-0" Stock - Black Pipe - Drilled for P202 on Both Ends
Add Tormentors and FOH Batten	5		P309 Intersection Bracket for 1½” Pipe
Add Tormentors and FOH Batten	2		P203u Unbranded Pipe Batten End Cap for 1½” Pipe - Yellow
Add Tormentors and FOH Batten	5	CMA110	Flat Ceiling Plate

Theatre Aisle Lights	1	Tivoli Aisle Lights	48 TIVO SATT-CE-35-06-C-8.0 SOFT AISLE TITANIUM CARPET TO EDGE PROFILE, 3500K LED ON 06IN OC SPACING STRAND, CLEAR LENS 8 FT Line Note: 4 RUNS @ 48 FT 4 TIVO SATT-CE-LS-EC-06 Soft Aisle Titanium, Carpet to Edge Left Slope End Cap with Clear Lens 4 TIVO SATT-CE-RS-EC-06 Soft Aisle Titanium, Carpet to Edge Right Slope End Cap with Clear Lens 20 TIVO SATT-LNS-SEALS Soft Aisle Titanium, Replaceable Lens Seam Seals 1 TIVO ADH-IA-10.2-CA End Cap Adhesive - 10.2 oz 13 TIVO ADH-MB-75AM-10 EXTRUSION ADHESIVE - 10.2 OZ 5 TIVO RONDB-5/32 Concrete Drill Bit - 5/32 inch (3.97 mm) 100 TIVO TM-3/16 Concrete Screw 3/16 inch

			(4.76 mm) x 1 1/4 inch (6.35 mm) Blue 3 TIVO INF-J-180-3-5-12 Infinity Class 2 Transformer 18W Min 180W Max 100-277VAC 3x5A Indoor and Outdoor 3 Circuit Breakers
Optional - On Stage Scenery Projector	1	V11HA67820	EB-PU2216B, WUXGA, 16000 lumens, 3LCD, laser, NO LENS
Optional - On Stage Scenery Projector	1	V12H004X0B	ELPLX02S UST Lens 0.35:1 For 9k to 20k Lumen Projectors - Black
Optional - On Stage Scenery Projector	1	CMS380	Truss Ceiling Adapter 1.5" NPT
Optional - On Stage Scenery Projector	1	VCMU	HD PROJECTOR MOUNT, UNIVERSAL
Optional - On Stage Scenery Projector	1	City Theatrical 4160	Projector Dowser
Optional - On Stage Scenery Projector	1	AC-MXNET-1G-DV2	MXNet 1G Evolution II Decoder --Not Compatible with V1 Systems
Optional - Lobby Late Arrival Video Monitors	2	AC-MXNET-1G-DV2	MXNet 1G Evolution II Decoder --Not Compatible with V1 Systems
Optional - Lobby Late Arrival Video Monitors	2	43BDL4650D/00	43" 3840 x 2160 UHD, 500nits, 24/7, Android SoC Display
Optional - Lobby Late Arrival Video Monitors	2	LCM1U	Large ceiling mount for flat panel

Optional - Lobby Late Arrival Video Monitors	2	CMA348	Large venue vibration isolating coupler, black
Optional - Lobby Late Arrival Video Monitors	4	CMS072	6 Fixed Pipe
Optional - Lobby Late Arrival Video Monitors	2	CMA360	I-beam clamp
Optional - Lobby Late Arrival Video Monitors	4	CONTROL 47C/T	Control 47C/T - Premium Two-way Coaxial Ceiling Speaker (with Extended Bass) with Extremely Consistent 120° Broadband Coverage featuring JBL's Radiation Boundary Integrator® (RBI™) Technology, 6.5" (165mm) woofer and 1" (25mm) tweeter, 55Hz - 20kHz frequency range, 75W cont. pink noise (150W program) power handling (100hr), 91 dB sensitivity, 60W 70V/100V multi-tap transformer with 8Ω direct, integrated backcan, white (RAL9016). Includes: C-Ring support backing plate, two tile support rails,

			cutout template (Priced as each; sold in pairs)
Optional - Wireless Microphone Expansion	12	EW-DX EM 2 DANTE (R1-9)	2 channel half-rack (9,5?) Dante? receiver. Includes (1) EW-DX EM 2 DANTE, (2) 1/4 wave antenna, (1) rack mount kit, and (1) EW-D power supply, frequency range: R1-9 (520 - 607.8 MHz)
Optional - Wireless Microphone Expansion	24	EW-DX SK (R1-9)	Bodypack transmitter with 1.38 inch (35 mm) jack. Includes (1) EW-DX SK and (2) AA batteries, frequency range: R1-9 (520 - 607.8 MHz)
Optional - Wireless Microphone Expansion	8	EW-DX SKM-S (Q1-9)	Handheld transmitter with switch. Includes (1) EW-DX SKM-S, (1) MZQ1 microphone clip, and (2) AA batteries, frequency range: Q1-9 (470.2 - 550 MHz)
Optional - Wireless Microphone Expansion	8	MMD 835-1 BK	Microphone module, dynamic, cardioid, for SKM 100/300/500 G3 and G4, SKM 2000/6000/9000, SKM D1/AVX, SL Handheld DW, black
Optional - Wireless Microphone Expansion	24		Senal UEM-155-35H-BE Headworn Microphone

			Boom
Optional - Wireless Microphone Expansion	1	GSM4230PX-100NAS	M4250-26G4XF-POE MANAGED SWITCH
Optional - Wireless Microphone Expansion	3	DISTRO4	DISTRO4 Four (4) Channel Antenna Distribution System
Optional - Wireless Microphone Expansion	1	DURASHIELD-25	DURASHIELD RJ45S/45S
Optional - Wireless Microphone Expansion	12	CG04026	4FT CAT6 SNAGLESS UTP CABLE-PUR
Optional - Wireless Microphone Expansion	1	ACR-1509-S	Rackmount Power Panel 15A
Optional - Upstage Cyclorama with Walk Along Track	1		ADC Flex I Track|1300 Series Track with Carriers and Cyc Chain
Optional - Upstage Cyclorama with Walk Along Track	1		Cyc 17" Tall X 50" Wide, Cotton Muslin Sky B, 12" OC Grommets, Pipe Hem Lined, 6", 2" Flat Hem Stage L/R

B. EC System/Product Details
   1. Auditorium Stage Lights – Stage Edge Lights
      a. Provide and install recessed LED edge lights along front edge of stage. As manufactured by Future Light, install 50 feet (1524 cm) of EdgeLyte safety LED edge lighting across the front edge of the stage. The strip shall be installed from the front edge of the stage and centered about the exact centerline of the stage. The LED's shall be EdgeLyte's wide angle version with blue LED's with the exception of the centerline which shall be amber, the quarter points and end points shall be red LED's. Install the EdgeLytes according to manufacturer's specifications which require a 3/4"Width 1/2" Deep groove be routed into the stage for installation. The EdgeLytes are held in place by a friction fit and are not to be glued. Route wiring under the stage to the manufacturer furnished controller to be located in a 2 gang box on the rear of the SR Proscenium wall. Connect the dimming controller to power. Final location of the strips and control box shall be determined by Consultant.

C. Curtain Specification

1. Contractor shall replace all stage curtains and install them upon completion of work in auditorium. Curtains shall be cord operated biparting curtain sections to be installed where noted on drawings. Curtain tracks shall be 14 gauge steel Model 280 Curtain Tracks CWANA from ADC, Automatic Devices Company. Each curtain carrier shall be spaced a minimum of 12" on center and according to manufacturer's recommendations. Carriers shall be of steel construction to include two nylon-tired ball-bearing wheels rolling on two separate parallel treads. Each curtain carrier shall consist of a free-moving plated swivel to accommodate curtain snap hook. Nylon snap-on spacers shall be attached to wheel supports of curtain carriers. Tracks shall be rigidly supported from manufacturer recommended brackets and fastened to the substrate with hardware that is appropriate in size and kind for the surface. (Submit hardware sample for review and approval prior to installation.) Each curtain shall be of single track design with biparting master carriers. Curtains shall stack at the ends of the track and be operated from side wall mounted operating lines where noted on drawings. Bottom tension pulley shall be mounted as directed in field.

D. DRAPERY FABRIC SPECIFICATION
1. Refer to accompanying drawings for locations and details of curtain additions. Final curtain dimensions are to be verified by the drapery fabricator and the sizes are to be noted on submittal drawings.
2. Drapery shall be box pleated minimum one foot on center with snap hooks located at each pleat. Snap hooks shall be sized to accommodate curtain track carriers.
3. Proscenium, window and variable acoustic curtains shall be Charisma IFR 25 oz Velour with IFR black liner fabric. Fullness to be as noted on drawings with liner fabric the same fullness. Curtain color TBD by School Personnel.
4. On stage traveler, border and leg curtains shall be Encore IFR 22 oz Velour. Stage borders shall be fully lined and other curtains unlined unless otherwise noted. Stage traveler and border curtains to be black.
5. Only full runs of fabric shall be used. No horizontal seems shall be permitted unless specifically indicated herein. Only first quality fabrics from a single dye lot for each color may be used in each installation.
6. Unless otherwise specified in drapery schedule or drawings, drapery shall contain a minimum of 100% added fullness.
7. Tops shall be turned over 1" and shall contain a double stitched continuous 3-1/2" jute webbing.
8. Curtains shall have nickel plated snap hooks attached with double riveted 1" heavy-duty cotton strapping along the top edges. Snap hooks are to be spaced 12" O.C. In the case of wall mounted curtains attached to wood blocking, provide screw eyes spaced 12" O.C. on the blocking to accept snap hooks. Attach snap hooks on the rear of the curtain in a manner that the snap hook and blocking are not visible when viewed from the front of the curtain and the top of the curtain remains vertical.
9. Bottom hems on full length draperies shall be turned up 6" and shall contain a separate pocket filled with continuous #8 zinc-plated steel jack chain or tape weights. Chain pockets shall be stitched so that the chain is suspended 2" above the bottom hem. Note special pocket fabrication for rear cyc as noted on drawings.
10. Stage curtains shall have a full 12" minimum center edge return. Proscenium traveler shall have a full 36" minimum center edge return.
11. Only inherently flame retardant fabric to meet the laws of the State of California, NFPA 701 Small and Large Scale, Boston Fire Department, New York Port Authority and Commonwealth of Massachusetts shall be used for face and lining fabrics.
    a. Provide a flame test strip sample for fabric used.
    b. Sample shall be sewn to the rear of the front curtains and shall run from the top of the bottom pocket up the edge.
    c. Test strip shall be 4" wide x 10 feet (304.8 cm) except where the drape is less than 10 ft. wherein the sample shall run to the top of the drape.

12. Provide a Certificate of Flameproofing listing all the draperies, provide in a Lexan 9”x 12” metal frame permanently screw anchored to the wall at 6’ AFF final location TBD by Architect. Certificate shall identify fabric type, flame proof rating, color, and location.
13. Fabricate curtains using sizes noted on contract drawings and field conditions when preparing submittal package. Final curtain dimensions are to be verified by the drapery fabricator and the sizes are to be noted on submittal drawings.

E. RIGGING REQUIREMENTS
1. Prior to fabrication submit detailed shop drawings of the proposed rigging system to the Architect and Consultant for review.
2. Support all hanging assemblies from the building structure as designated by the drawings. Hanging assemblies shall be connected to the structure only by cable from manufacturer installed rigging points using properly sized and rated hardware for each device.
3. Mount all equipment firmly in place with a safety factor of at least three. Mount all equipment plumb, level, square and snug to mounting surface as required.
4. Hanging assemblies shall be supported via 7x19 galvanized aircraft cable with load rated turnbuckles, properly sized cable thimbles and fastened with copper Nicopress compression fittings. Cables shall be sized to be able to support the entire hanging device from one point with a safety factor of three times for each support cable.
5. Provide a follow-up inspection one week after installation of the hanging elements to retighten any temporary cable clamps to proper torque. (In the case of properly applied Nico press sleeves this step is not necessary.) Nico press sleeves shall only by applied with a ratcheting crimping tool made expressly for this purpose and each sleeve is to be checked with a properly sized Go/No Go Gauge. All permanent rigging connections are to be made using copper Nico press sleeves appropriately sized according to cable used. Installation shall only be performed with ratcheting crimping devices. The presence of non-ratcheting crimping devices on the jobsite shall be cause for rejection of all rigging crimp terminations.
6. Safety cables must not be under tension & care should be taken in cable routing to prevent unwanted vibrations.
7. Adjust tilt and pan angles of all hanging assemblies according to those shown on the drawings. This shall be considered an initial rough aiming of hanging assemblies. A separate final adjustment will be done under the direction of the Consultant during field tests.

F. AUDIO VISUAL INSTALLATION
1. Supply and installation of the audio visual equipment shall be the responsibility of the Electrical and Audio Visual Contractors (EC/AV). Preparation of the structure by providing necessary wall and ceiling openings with proper trim out is the responsibility of the General Contractor (GC). Cooperation of all trades is necessary for the proper support, trim out, masking and integration of all audio visual devices. The following section outlines various parts of the installation and defines areas of responsibility by all parties involved. Any further questions of responsibilities shall be determined by the Architect.

G. GENERAL CONTRACTOR RESPONSIBILITIES
1. Speaker openings and the area between the ceiling line and roof deck shall be free and clear of any non-structural obstructions such as but not limited to conduit, pipes, cables, black iron, ducts, mechanical equipment etc.
2. Any speaker grilles specified shall be easily lowered and raised for speaker aiming, servicing and maintenance. Provide permanent rigging points on the grille frame itself as well as rigging points above the finished ceiling accessible without ladders or scaffolding above the ceiling. Contractor shall lower the speaker grille for speaker aiming and demonstrate its removal and reinstallation for the Architect, Consultant and Owner.
3. In open ceiling plans where the space above the ceiling line is visible from the seating area, all visible surfaces both structural and non-structural including mechanical and electrical components shall be painted flat black or coated with a flat black acoustical material as specified by the Consultant. In the case of lighting or other heat producing devices the component shall be furnished with a flat black heat resistant finish applied by the device

manufacturer and approved by the Architect. Approved installation clips, hangers and straps shall likewise be black in color. Locations visible from the seating area shall be treated as finished spaces with a minimum number of conduits, cables etc. exposed to the area below. Where routing through the open space is unavoidable, conduits, cables and pipes shall be ran above and parallel to structural elements.

H. Rigging Equipment
   1. General:
      a. The rigging scope of work for the Electrical Contractor includes hanging of all Audio-Visual devices noted, (in addition to supplying technical power and low voltage cabling to each device), supplying and installing all projection screens, boards and projectors.
      b. Electrical Contractor shall supply and install all auditorium rigging. Rigging is to include but not be limited to lighting battens, cable supports, scenic battens, curtains and associated rigging. Power and control wiring for all motorized linesets is also to be provided by the EC.
      c. In the case of all rigging the EC shall use licensed, approved and experienced rigging and audio visual sub contractors. The EC shall be responsible to see that rigging sub contractors supply all required rigging drawings (sealed by a PE licensed in the state of New York when required) as part of their submittal package for review by the Architect.

PART 3 EXECUTION

4.01 INSTALLATION

A. General
   1. Comply with manufacturer’s product data, including product technical bulletins, product catalog installation instructions and product carton instructions.
   2. Mount all equipment firmly in place with a safety factor of at least three. Mount all equipment plumb, level, square and snug to mounting surface. Mount all equipment such that the equipment receives adequate ventilation for safety, reliability and longevity. In all equipment racks, provide a Middle Atlantic single rack space vent rack panel at the top and bottom of the equipment rack unless otherwise noted. Keep all vents free from blockage.
   3. Terminate all signal, control and equipment rack wiring. Wire all equipment and controls to eliminate anomalous interaction with and noise induction into, from or between other equipment, systems and radio frequency interference. Employ lead free rosin-core solder when hard-wiring. Employ other terminating devices only as specified or as submitted upon and approved. Twist on "wire-nuts" and crimp on type connectors are not approved connectors.
   4. All rack wiring shall be grouped, combed, bundled and laced according to signal type. When viewing the rack from the rear microphone lines shall be on the right towards the rear of the rack. Line level cables shall be spaced 8” forward of that also on the right side. AC power lines shall run on the left side towards the rear of the rack with the speaker lines spaced 8” forward of that also on the left side. A copper ground buss bar shall be centered between the AC and speaker lines and shall be electrically isolated from the rack.
   5. Resistively build out or terminate all passive signal processing devices, and record as part of the as-built documentation the designs and values of all build out and terminating pads.
   6. Make minor changes and adjustments to equipment and systems as requested by the Consultant or Client's authorized representative.
   7. All audio, video, control and networking cables shall be in steel conduit unless otherwise noted on Contract drawings. Size all conduits to provide a maximum fill of 40% of full capacity. Provide drag lines in all conduits to allow for future requirements. Conduit entries to AV equipment racks shall be made via flexible conduit with electrically isolated non-metallic bushings to decouple the rack from the conduit and any building steel.
   8. Maintain a minimum spacing of 12” between parallel runs of AV and control system cabling and electrical power lines. Where it is necessary that the two cable types cross, the crossing shall be made at 90 degrees to one another.

9. Equipment racks shall be isolated from all building steel. To isolate the bottom of the rack provide an approved wooded or plastic base or mount rack on locking insulated casters.
10. Electrical Contractor shall be responsible for interconnection or changes to Clients network including passwords, IP addresses, design and administration as required by scope of project. Prior to interfacing with Client's network receive approval from Client's IT manager. Costs for correction of any damage to the Client's network shall be the responsibility of the Electrical Contractor.
11. Miscellaneous items necessary, whether or not on drawings or specification, which are necessary for achieving the intent of the owner and design team shall be included within Contractors' and Sub-Contractor scope of responsibilities.

B. Electrical Power & System Grounding
1. The Contractor shall supply and install sufficiently sized surge suppressing outlet strips within the equipment racks connected to the dedicated/designated 20A audio power circuits supplied by the Electrical Contractor. The surge suppressing outlet strips shall have an adequate number of receptacles for all AV equipment. In the case of multiple amplifier systems, keep line level signal processing equipment and power amplifiers on separate electrical circuits. Two additional utility receptacles and a Consultant approved work light shall also be provided in the rack. The sound contractor shall provide AC outlets for all rack equipment using Hubbell IG5262 and IG5362 isolated ground receptacles as necessary. Receptacles shall be mounted in single gang boxes and conduit for the full height of the rack. All receptacles shall be controlled by the sequential turn-on system when present.
2. When specified provide a separate "Technical Ground" within the equipment rack. This unipoint ground buss bar shall be connected to the 00AWG insulated ground cable supplied by the Electrical Contractor. The unipoint ground buss bar shall be a solid copper bar with a minimum cross sectional dimension of 3/8"x ½" for the full height of the rack. The buss bar shall be completely insulated from the rack except for one point with approved commercially available isolators. Ground any equipment without a three-conductor power cord directly to the buss bar with #12 green insulated copper wire and copper mechanical connectors fastened to the buss bar with 8-32 stainless steel hardware. Tie each and every power outlet ground contact to this buss bar with #12 green insulated copper wire. Gather all shield and chassis grounds and terminate them as well as the equipment rack to the isolated ground buss terminal strip. Provide unipoint grounding for all audio and video systems. Wire patchbays and other intermediating devices to provide positive protection from duplicate shield grounding. An additional isolated ground receptacle shall be installed at any remote equipment locations. This receptacle along with all others feeding power to the sound system shall be fed from the same electrical phase. The receptacles for all remotely located AV equipment shall be on the same circuit as the rack mounted signal processing equipment.
3. Electrical power and isolated grounding shall adhere to conventions described in NEC Article 250-74 Exception No.4. Once the Main Equipment rack is permanently installed, it is the Contractor's responsibility to coordinate with the Electrical Contractor the installation of the isolated ground AC circuit feeds to the rack. The Electrical Contractor shall install rack power wiring through insulated non-metallic conduit bushings to keep the rack isolated from the building conduit and steel.
4. Insulate audio, video, control wiring, DMX wiring and equipment racks from the building conduit system.
5. Wire unbalanced circuits with two-conductor shielded cable using cable conductors for hot and common and cable shield as a separate shield at the destination connector. Insulate unterminated shield drain wires with heat-shrink tubing.
6. Carry shields past isolation transformers, relays, etc. and ground shields to patchbay ground bus where patchbays are present or to a dedicated rack ground bus where no patchbays are present and insulate shield drain wires with insulating "spaghetti" and heat-shrink tubing. Do not terminate shields at equipment terminations. Insulate unterminated shield drain wires with heat-shrink tubing.

C. Cabling

1. Provide identical conductor color coding for all cables furnishing identical functions throughout the systems.
2. All audio and video system conductors to and between the main equipment rack and associated components shall be installed in one continuous length free from splices or other breaks. Unless otherwise specified splicing of audio, video, control or DMX wiring is not permitted.
3. Isolate all audio and video lines from the conduit systems. Insulate shield drain wires with insulating "spaghetti" and heat-shrink tubing.

D. Connectors
1. Terminate audio XLR connectors for Pin 1=shield, Pin 2=high and Pin 3=low and 1/4" connectors for Tip = high, Ring = low and Sleeve = shield except where shown otherwise on the drawings or in manufacturer's instructions. Mount all panel-type XLR connectors to their plates with stainless steel oval-head Phillips screws. Apply liquid locking compound to all threaded fittings.
2. Terminate DMX XLR connectors for Pin 1=shield, Pin 2=high and Pin 3=low and 1/4" connectors for Tip = high, Ring = low and Sleeve = shield except where shown otherwise on the drawings or in manufacturer's instructions. Mount all panel-type XLR connectors to their plates with stainless steel oval-head Phillips screws. Apply liquid locking compound to all threaded fittings.
    a. Device Plate Assemblies
3. Mount device plates to junction boxes, snug to mounting surfaces, with stainless steel oval-head Phillips screws having matching finish.
    a. Equipment Rack Panel Assemblies
4. Mount equipment and blank panels to rack rails with black tamper resistant screws and black fiber washers.
    a. Controls And Indicators
5. Render all controls not required for moment-to-moment adjustment by system operators inaccessible or tamper-proof. Acceptable means of security include mounting security panels over controls, recessing equipment behind locking rack-mounted access door, removing knobs and adding positive shaft locks and mounting equipment on rack rails in rear of equipment racks. Cover any equalizer, limiter and controller with Middle Atlantic SF series security covers. Do not conceal indicators required for proper operator adjustment. Package removed knobs in clear plastic pouch and secure within equipment rack for potential future use.
    a. Labeling
6. All equipment items, device plates, equipment rack panels, devices, controls, receptacles and cables shall be labeled as to the function performed and the area served. Any custom labels specified which are not part of a custom engraved panel, shall be engraved white lamacoid with black letters at least 1/8" high. Custom panel engravings shall be 1/8" high
7. The Contractor shall develop a labeling scheme reflecting the nomenclature and architecture of this project which conforms to the guidelines listed below and shown on the drawings. This labeling scheme shall be submitted to the Consultant for written approval before execution.
8. The Contractor shall communicate the approved labeling to the manufacturer of the devices plates and rack panels when placing his order. Provide the Consultant photocopies of each individual plate and panel with the desired labeling shown prior to fabrication.
9. Use only area designations obtained from the Consultant for permanent labels.
10. Mark all cables with custom printed "Brady" type cable markers covered with clear heat-shrink tubing within 6" of the terminations designating the cable function and terminating device nomenclature. Use identical designations at both ends of cables and carry designations through intermediate terminations. All labeling shall be clearly visible without the need to remove cable ties or disrupt cable bundling. Employ the legends "M-xxx" for microphone cables, "A"-xxx for line level audio cables, "S"-xxx for speaker cables, "C-xxx" for control cables, "N-xxx" for network cables, "RF"-xxx for antenna cables and "V-xxx" for

video cables, etc. where "x" is the approved cable number. Numbering shall follow a logical ordering by cable type, system stage and wherever possible reflect equipment input and output number assignments. Note proposed numbering on shop drawings for review and approval by Consultant.

11. Label microphone and associated line receptacles, and video receptacles, in consecutive alpha-numeric order according to the sound system wiring schedule circuit numbers. Continue the consecutive numbering through all areas. Do not repeat any numbers. All wall receptacles shall be labeled on the wall plate itself. Floor pocket receptacles shall be labeled on the inside of the pocket covers on one large engraved label with engraved markings physically aligned with their respective receptacles.
12. Employ the legends "MIC-n", "LINE-n" and "VIDEO-n", where "n" is the approved receptacle number as noted on the receptacle schedule.
13. Label all rack panel controls with the approved designations for the device or area served by each control.
14. Label manufacturer-furnished equipment items as to their functions, the areas served and all input and output controls as to function and areas or receptacles served. Label with Metalphoto or, where impracticable, with engraved plastic-laminate designation strips having a background color matching the equipment panels and black, white or clear contrasting lettering. Affix labels to front edge of equipment rack alongside of unit with the top edge of the label aligned with the top edge of the device.
15. Install 3/16" diameter vinyl "map dots" as indicators for normal operating positions of all rotary controls remaining for operator adjustment. Provide multiple indicators, adequately distinguished, for controls having more than one nominal operating position.
    a. Equipment Racks
16. Submit shop drawings showing proposed rack layout to the Consultant for approval prior to fabrication. Mount perforated ventilation panels at the top and bottom of the rack unless otherwise noted on rack elevation drawings.
17. Install equipment to provide free access to all equipment terminations. Installation requiring the demounting or de-energizing of equipment for access to terminations is not acceptable.
18. Install hinges on any moveable chassis cover which mounts wired components for contractor-fabricated equipment items. Dress and secure associated wiring with a proper service loop and provide cover restraints to hold the cover and its wired components in a serviceable position.
19. Fill all unused rack space with black blank filler or vent panels. Use Middle Atlantic flanged 16ga. steel panels.
20. Provide the main equipment rack with locking front and rear doors. Key all equipment doors identically. Door hinge direction shall be shown on shop drawing submittals and must be approved by Consultant before fabrication.
21. Contractors shall wire all equipment racks completely in their shop. Use one-pair, 20AWG, stranded, foil shielded and jacketed cable for all internal microphone and line-level wiring and one-pair, 14AWG, stranded and jacketed cable for all internal 25V and 70.7V speaker level wiring. Do not ground 25V or 70.7V speaker commons or bus any speaker commons. Separate microphone, line and speaker level cables in racks as far as possible, crossing lines only at right angles. Locate AC power lines and receptacles in the rear left, microphone and line level to the right, with microphone lines towards the rear. Locate speaker level lines towards the front on the left side. All cables shall be fully supported through the use of nylon cable ties fastened to smooth metal wiring rails other than the equipment mounting rails.
22. Low impedance speaker lines shall be wired directly to their respective power amplifier terminals in a continuous run using 10AWG, stranded twisted pair cable and 12AWG twisted pair cable as noted in equipment list.
23. Provide all cables with no less than a 6" diameter service loop. In no cased shall cable bends be less than that recommended by the cable manufacturer.
24. Terminate all audio and control lines entering the equipment racks to approved terminal blocks. Label the screw positions with machine printed labels as to the cable served and the conductors of that cable.

25. Float all equipment racks from the building electrical power conduit system. Install heavy-duty locking casters or adjustable leveling feet on free standing racks and isolate the rack by setting the feet on hard rubber isolation pads as manufactured by Mason Industries or on isolated locking casters as noted on drawings.
26. The Contractor shall take such precautions as are necessary to prevent and guard against electromagnetic, electrostatic and radio frequency interference.
    a. Electrical contractors responsibilities
27. Electrical Contractor and AV Contractor, shall supply and install speakers, projector, interconnection plates and all AV devices and wiring noted on drawings. The speakers shall be supported from vertical pipes attached to the building structural elements above. The speakers shall be provided with aiming devices from the speaker's manufacturer.
28. The Electrical Contractor shall provide power to all AV devices whether on electrical drawing or not.
29. In open ceiling plans where the space above the ceiling line is visible from the seating area, all visible surfaces both structural and non-structural including mechanical and electrical components shall be painted flat black by the GC. In the case of lighting or other heat producing electrical devices the component shall be furnished by the EC with a flat black heat resistant finish applied by the device manufacturer and approved by the Architect. Approved installation clips, hangers and straps shall likewise be black in color.
    a. Hanging Loudspeaker Clusters
30. Prior to fabrication submit detailed shop drawings of the proposed rigging system to the Consultant and Architect for review.
31. Mount all equipment firmly in place with a safety factor of at least three. Mount all equipment plumb, level, square and snug to mounting surface as required.
32. Where noted vibration isolation hangers are #W30N series sized according to the manufacturer's recommendation for the final cluster weight. Speakers, cables and wire rope must only come into contact with the structure at the building steel support points. Prior to fabrication submit detailed shop drawings of the proposed rigging system to the Consultant for review.
33. Safety cable must not be under tension & care should be taken in cable routing to prevent unwanted vibrations. All signal wires shall be attached to the safety cable with black nylon cable ties spaced every 4". Leave sufficient slack at each end so that in the event the safety cable is pulled taut, there will be no tension exerted on the signal wires.
34. Adjust tilt and pan angles of all hanging assemblies according to those shown on the drawings. This shall be considered an initial rough aiming of hanging assemblies. A separate final adjustment to be done under the direction of the Consultant during field tests at the completion of the installation.
    a. Audio Visual Installation
35. Supply and installation of the audio visual equipment shall be the responsibility of the Electrical and Audio Visual Contractors (EC/AV). Preparation of the structure by providing necessary wall and ceiling opening with proper trim out is the responsibility of the General Contractor (GC). Cooperation of all trades is necessary for the proper support, trim out, masking and integration of all audio visual devices. The following section outlines various parts of the installation and defines areas of responsibility by all parties involved. Any further questions of responsibilities shall be determined by the Architect.
    a. Control System Graphic User Interface (GUI)
36. Designated help page shall display contractor's name and daytime and 24 Hr. contact information.
37. Contact information for Audio Contractor, Video Contractor, Rigging Contractor, and Lighting/Dimming Contractor shall be provided on designated page.
38. Project name and user selected graphic to appear on initial welcome screen and wherever determined by consultant.
39. Contractor shall furnish Touch Screen GUI screen shots for approval by consultant.
40. Programming of all AV devices, control devices, and user interface devices shall be included in base contract bid. No added costs for programming.

4.02 FIELD QUALITY CONTROL

A. General
1. Provide the following diagnostic equipment to perform the system tests, measurements and adjustments: sound level meter, calibrated test microphone, sine wave generator, pink noise generator, impedance meter, audio oscilloscope, 1/3-octave, or greater resolution, real time frequency spectrum analyzer, RMS responding voltmeter and phase checker.
2. Recently calibrated diagnostic equipment manufactured by Norsonics, Bruel & Kjaer, Larson Davis, Hewlett-Packard, Tektronix, Ivie, Sound Technologies and similar manufacturers will be acceptable for these tests; non-professional equipment or shop assembled kits will not be accepted.
3. Assist the Consultant in confirming that the performance requirements are met by providing the test equipment listed above and by assisting him as requested during the inspection measurements. Make system adjustments, speaker cluster orientations, equalization, electrical gains and losses and other adjustments as requested.

B. Before Delivery To The Site:
1. Shop-test all equipment before assembly into systems to confirm that the products meet or exceed the manufacturer's parameters for:
   a. Functional capability and control;
   b. Electrical gain;
   c. Self-generated noise;
   d. Frequency response;
   e. Distortion; and
   f. Freedom from RFI, EMI, and other interference.
2. Shop-test all equipment rack and contractor-fabricated subassemblies for proper function and performance levels before inspection by the Consultant in the Contractor’s shop. Following review and acceptance by the Consultant arrange for delivery to the installation site.
3. AV contractor shall contact Consultant for a complete functional system checkout in AV Contractors shop prior to delivery & install. Allow a minimum of six (6) weeks prior to install to allow for correction of non-conformance issues.

C. Before Loudspeaker Installation:
1. Measure the impedance of each loudspeaker assembly at 63Hz, 250Hz, 1kHz, 4kHz and 16kHz. Exclude those measurements which would fall outside the assembly's nominal operating frequency bandwidth. Reject and replace any assembly measuring below 80% of its nominally rated impedance.
   a. Before Terminating Loudspeaker Lines:
2. Acoustically inspect the polarity of each distributed loudspeaker assembly as terminated and change the wiring as required to bring all loudspeakers into the same polarity.
3. Set all loudspeaker-line volume controls to their maximum settings. Measure the impedance load of each loudspeaker line presented to each amplifier channel at the frequencies listed above. Exclude those measurements which would fall outside the loudspeaker system's nominal operating frequency bandwidth. Disconnect and connect or replace any loudspeaker which produces a lower impedance value less than the amplifier channel to which it is to be connected. Record the final measurements.
4. Terminate the output of each amplifier channel to a load resistor whose value is equal to that of the associated loudspeaker load. Drive the amplifier channel with a 1 kHz sine wave signal. Adjust each amplifier channel to produce its maximum output with 0.5% THD or less.
   a. Measure and record the input signal amplitude required to achieve maximum output. Reject and replace any amplifier which does not meet its specification for input sensitivity.
   b. Measure and record each amplifier channel's output signal amplitude.

c. Compute and record each amplifier channel's output power and voltage gain. Reject and replace any amplifier which does not meet its specification for maximum output power or voltage.

D. Before Adjustments:
1. Measure the DC resistance of all microphone and other input lines with each conductor pair and each conductor/shield pair open and shorted. Measure DC resistance of each conductor referenced to building ground to affirm an open circuit. Correct any shorts, erroneous opens or unusual resistances. Record the final measurements.

E. Following Adjustments:
1. Record the settings of all equalizers, DSP units and level controls.
2. Record the acoustic amplitude response of all loudspeaker systems with the microphones and real-time frequency analyzer set as for the equalization adjustments. Record the electrical response of all equalizers with the real-time analyzers connected to the equalizer outputs.
3. Connect the oscilloscope and RMS voltmeter in parallel with each load resistor. Set the oscilloscope for 10mV per major display division and the voltmeter for measurement of voltages in the millivolt range. Inspect the oscilloscope display at all sweep rates and the voltmerter for the presence of radio frequency, electromagnetic and other outside interference with all lighting and HVAC systems in their various normal operating modes, all system gains and losses set for nominal operation and with no signal present. Aurally monitor the system for the presence of interference. Repeat the inspections with the system momentarily driven to full power at 160Hz. Correct any cause of interference greater than 80dB below the maximum rated output of the amplifier. Record the descriptions, levels and frequencies of any residual interference.
   a. Disconnect the loudspeaker loads from the amplifiers and connect load resistors having values equal to the loudspeaker load impedances to each amplifier output in turn. Terminate the mixer inputs with shielded resistors of 150 ohms for microphone inputs, 15 kilohms for line-level inputs and 47 kilohms for auxiliary inputs with all gains and losses set for nominal operation.
   b. Remove a shielded resistor from one mixer input and reconnect the unterminated input line. Repeat the inspections for the presence of radio frequency, electromagnetic and other outside interference from each input and for all inputs with all lines reconnected, correcting any cause of noise greater than -80dB.
   c. Reconnect the loudspeaker loads and aurally monitor each loudspeaker line while raising the input gain of each input in turn. Correct the cause of any noise significantly greater in one channel than in another. Return the input level settings to their nominal positions.
   d. Record the final noise/signal-plus-noise ratio for each input channel with its input line connected and its input gain control set for nominal operation and the summed noise/signal-plus-noise ratio with all input lines connected and all input level controls set for nominal operation.
4. Deliver a 1kHz sine wave signal to each input with sufficient level to drive each amplifier to its full rated output with all gains and losses set for nominal operation. Measure the total harmonic distortion of each input/output channel. Correct any cause of distortion greater than 0.5%. Record the final distortion measurement for each channel.

4.03 ACCEPTANCE TESTING AND ADJUSTMENTS

A. Upon completion of the installation and initial tests acceptance testing and adjustments will be performed by the Consultant:

B. Output Industries

C. Tavernier, FL

D. (631) 247-9014

E. The Contractor shall provide a technical representative familiar with all aspects of the system together with all necessary service personnel to aim all speakers, lighting instruments and/or readjust settings as directed by the Consultant. The Consultant shall oversee various aspects of the final commissioning by all contractors (AV, EC & GC) such as;
   1. Electro/acoustical aiming of speakers.
   2. System equalization.
   3. Software set up and adjustment of all DSP and analogue parameters.
   4. Setting of all lighting presets for production and house lighting controls at equipment rack and production control panel.
   5. Setting of all rigging presets for motorized line sets and trim heights for all deadhung linesets.
   6. Layout of graphic and operational elements associated with any control system touchpads, touchpanels, GUI or User system interface device.
   7. Contractors shall make any adjustments, mechanical, graphical or electronic, to the systems that are deemed necessary by the Consultant.

F. The AV Contractor shall provide service personnel and any necessary tools or scaffolding for aiming as part of this contract. Technical assistance, equipment and scaffolding must be provided for each site visit by the Consultant when requested by Consultant.

G. Contractor must fully test system in shop under the direction of Consultant before delivery to site. System is to be fully tested on site by Contractor before final acceptance testing.

H. Additional costs for the Consultant's inspections and verifications due to installation or adjustment errors shall also be borne by the Contractor. Inspection of fabrications at locations outside of Suffolk and Nassau Counties shall also be borne by the General Contractor.

4.04 TRAINING

A. Familiarize Owner designated operating or supervisory personnel and the Consultant with the installation, configuration, operation and day-to-day maintenance of the equipment during installation and without delaying the work. Permit these personnel to observe the tests, measurements and adjustments explaining the significance of each operation.

B. Contractor shall provide all equipment, materials and labor to demonstrate proper operation and maintenance to the Consultant and end User.

C. Contractor shall prepare and furnish a written operational "Quick Guide" to the Client describing basic use of system components.

D. Provide a minimum of 8 hours of training per system. Each training session shall be a minimum of 1 hour and a maximum of 3 hours. Training sessions are to be scheduled at times determined by the District within 6 months after system commissioning and acceptance. Contractor shall schedule training sessions at times convenient and agreeable to all attendees. District maintains the right to schedule some of the training before future productions and events in the auditorium.

4.05 SPARE PARTS

A. Deliver two sets of keys for each type of operational lock used in the systems to the system supervisory personnel upon completion.

B. Deliver five fuses of each type and value used in the systems and which are user-replaceable.

C. Deliver a set of spare batteries for each battery operated device.

D. Upon completion deliver to the Architect and Consultant; all software source codes, passwords, key panel lockout codes etc. on disk or in other form required by Consultant.

END OF SECTION

PART 1 -GENERAL

1.01 SECTION INCLUDES

A. Visual Devices.

B. Audio/Visuals.

C. Addressable Smoke Detectors.

D. Addressable Carbon Monoxide Detection and Alarm.

E. Pull Stations.

F. Door Hold/Release

1.02 REFERENCES

A. NFPA 70 - National Electrical Code.

B. NFPA 72, 72G, 72H - National Fire Alarm Code.

C. NFPA 101 - Life safety code.

1.03 WORK INCLUDED

A. Furnish and install as described in these specifications and as indicated on the drawings, fire alarm and smoke detection equipment with battery backup. New fire alarm system shall be voice command. Contractor shall provide all new devices as required for a fully functioning voice command system for the new addition and existing cafeteria.

1. All equipment shall be UL listed under category UOJZ as an integrated control system; equipment listed under category UOXX as a control unit accessory shall not be acceptable. The installation shall meet the applicable requirements of NFPA 72 and New York State Code, as well as those standards set by the authorities having jurisdiction.
2. All panels and peripheral devices shall be the standard product of a single manufacturer and shall display the manufacturer's name on each component. The catalog numbers specified under this section constitute the type, product quality, material and desired operating features.
3. Provide all labor, materials and services to perform all operations required for the complete installation and related work shown on the drawings and as specified herein.
4. All electrical work and equipment shall meet the requirements of NFPA 70 and 72.
5. **For any facilities that utilize an existing fire alarm system, the contractor shall coordinate with the owner and fire alarm monitoring company prior to removing or disabling any devices. It shall be the contractor’s responsibility to provide fire watch as per the latest addition of the Fire Code of New York State. The contractor shall provide fire watch for all areas of a facility while occupied and unoccupied when any device or part of the fire alarm system is de-activated or put into “test mode”.**

1.04 SUBMITTALS

A. **All submittals and as-built drawings shall be reviewed and stamped by a NY State licensed P.E. Non-stamped drawings willl be automatically rejected.**

B. Submit product data as required by Section 013300.

1. Two copies of all submittals shall be submitted to the Architect/Engineer for review.
2. All references to manufacturer’s model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality.
3. Equivalent equipment (compatible UL-Listed) from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met, and upon approval of the Architect/Engineer.

C. Shop drawings:

1. Provide a list (bill of materials) of all types of equipment and components provided.
2. Provide annunciator layout and system wiring diagram showing each device and wiring connection required, including existing equipment. Provide a description of operation of the

system. Provide system ampere load and time calculations to substantiate compliance with battery back up (24 hours in non-alarm condition followed by 5 minutes in alarm, after normal power loss)

3. Sufficient information, clearly presented shall be included to determine compliance with drawings and specifications.
4. Include manufacturer's printed product data with name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.

D. Manuals:
1. Submit simultaneously with the shop drawings, complete operating and maintenance manual listing the manufacturers name(s) including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each item of equipment and the interconnections between the items of equipment.
3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.
4. Indicate application conditions and limitations of use stipulated by product testing agency.
5. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of products

E. Test Reports and Certifications:
1. Indicate satisfactory completion of required tests and inspections.
2. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 017839.

B. On as-built installation drawings: Record actual locations of initiating devices, signaling appliances, and end-of-line devices, including those that are existing.

C. Provide a written sequence of operation to the owner.

D. Provide site specific software and program, including all addressable points.

E. A completed NFPA 72 Inspection and Testing form shall be submitted to the owner, prior to system acceptance.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Section 017839.

B. Maintenance and testing shall be on a semiannual basis or as required by the Authority Having Jurisdiction (AHJ). A preventive maintenance schedule shall be provided by the Contractor that shall describe the protocol for preventative maintenance. The schedule shall include:
1. Systematic examination, adjustments and cleaning of all detectors, manual fire alarm stations, control panels, power supplies, relays and all accessories of the fire alarm system.
2. Each circuit in the fire alarm system shall be tested semiannually.
3. Each smoke detector shall be tested in accordance with the requirements of NFPA 72 Chapter 7.

1.07 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum ten (10) years documented experience, and with service facilities within fifty (50) miles of project location.

B. Installer: Company specializing in installing the products specified in this section with minimum three (3) years documented experience, and certified by the State of New York as fire alarm installer.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. EDWARDS EST3 (EXISTING)

B. APPROVED EQUAL.

2.02 GENERAL

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approval agency for use as part of a protected premises protective signaling (fire alarm) system.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning equipment installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.03 CONDUIT AND WIRE

A. Conduit:
   1. Conduit shall be in accordance with the National Electric Code (NEC), local and state requirements.
   2. All wiring shall be installed using plenum rated cable.
   3. Cable must be separated from any open conductors, as per NEC Article 760-29.
   4. Wiring for 24 volt control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals
   5. Conduit shall enter the Fire Alarm Control Panel, Remote Annunciator Panel and/or backboxes where conduit entry is designated and permitted by the FACP manufacturer.
   6. Conduit shall be ¾ inch (19.1 mm) minimum.
   7. In finished areas where conduit cannot be concealed, surface mounted raceway is to be used.

B. Wire:
   1. All fire alarm system wiring shall be new.
   2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760), and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and not less than 14 AWG (1.63mm) for Notification Appliance Circuits. All wiring shall be of the type recommended by the manufacturer.
   3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
   4. All wire and cable shall have a fire resistance rating suitable for the installation as indicated in NFPA 70, and shall test free from grounds or crosses between conductors.
   5. Wiring used for the multiplex communication loop shall be twisted and shielded and installed in conduit unless specifically excepted by the fire alarm equipment manufacturer. The system shall permit use of IDC and NAC wiring in the same conduit with the communication loop
   6. All field wiring shall be completely supervised.

C. Terminal Boxes, Junction Boxes and Cabinets:
   1. All boxes and cabinets shall be UL listed for their use and purpose.

D. Circuits shall be arranged to serve like categories (manual, smoke, horn, strobe). Mixed category circuitry shall not be permitted except on signaling line circuits connected to addressable reporting devices.

2.04 SEQUENCE OF OPERATIONS

A. Fire Alarm System Sequence of Operation

1. Operation of any manual fire alarm station or activation of any smoke sensor, area smoke detector, duct smoke detector, or heat detector throughout the building shall automatically:
   a. Sound all horns throughout the building with an individual Temporal ‘3’ Code. The alarm signals may be silenced during the alarm condition by operation of the FACP alarm silence switch. Subsequent alarm conditions shall re-sound the alarm horns/speakers.
   b. Flash all alarm strobe lights throughout the building. The alarm strobe lights shall be turned off when the system is reset.
   c. Display a general alarm indication and system status summary (numbers of alarm, supervisory and/or trouble conditions) on the FACP liquid crystal display (LCD). Pressing the alarm acknowledge key shall display, for thirty (30) seconds, the individual device or circuit display, to include the "alarm" status and custom label (up to forty characters and spaces) for the addressable device or circuit of alarm initiation on the liquid crystal display (LCD). At the end of the thirty (30) second period, the general alarm indication and system status summary shall again be displayed. The individual device/circuit display may be recalled at any time by repressing the alarm acknowledge key or until the alarm condition is reset to normal.
   d. Enter the alarm condition custom label with time and date of occurrence into the FACP historical alarm log for future recall.
   e. Shutdown all fans over 1000 CFM.
   f. Release Magnetic Door Hold Opens.
   g. Recall elevator as per existing system programming.
   h. Activate circuit and initiate alarm to central station. The Central station monitoring shall be furnished by owner.
2. Operation of any carbon monoxide detector the building shall automatically:
   a. Sound the integral sounder base on the carbon monoxide detector in alarm only, with an individual Temporal ‘4’ Code. The alarm signals shall only be silenced when carbon monoxide detector is no longer in alarm.
   b. Display/sound an alarm indication and system status summary (numbers of alarm, supervisory and/or trouble conditions) on the FACP liquid crystal display (LCD) stating “Carbon Monoxide Alarm”. Pressing the alarm acknowledge key shall display, for thirty (30) seconds, the individual device or circuit display, to include the "alarm" status and custom label (up to forty characters and spaces) for the addressable device or circuit of alarm initiation on the liquid crystal display (LCD). At the end of the thirty (30) second period, the general alarm indication and system status summary shall again be displayed. The individual device/circuit display may be recalled at any time by repressing the alarm acknowledge key or until the alarm condition is reset to normal.
   c. Enter the alarm condition custom label with time and date of occurrence into the FACP historical alarm log for future recall.
   d. Shutdown all fans over 1000 CFM.
   e. Release Magnetic Door Hold Opens.
   f. Recall elevator as per existing system programming.
   g. Activate circuit and initiate alarm to central station stating “Carbon Monoxide Alarm”. The Central station monitoring shall be furnished by owner.

2.05 MAIN FIRE ALARM CONTROL PANEL

A. The fire alarm system control panel is a EDWARDS EST3 (EXISTING).

2.06 ANNUNCIATION (NOTIFICATION) DEVICES

A. The visual and audio/visual signaling devices shall be compatible with the existing fire alarm control panel as stated in the installation manuals and be Listed with Underwriters Laboratories Inc. per UL 1971 and/or 1638.

B. The visual and audio/visual signaling devices shall be wall mounted to meet ADA requirements.

C. Each indicating appliance circuit shall be electrically supervised for opens, grounds and short circuit faults, on the circuit wiring, and shall be so arranged that a fault condition on any indicating appliance circuit or group of circuits will not cause an alarm to sound. The occurrence of any fault will light the trouble LED and sound the system trouble sounder, but will not interfere with the proper operation of any circuit which does not have a fault condition.

D. The notification appliance (combination audio/visual units only) shall produce a peak sound output of 90dba or greater as measured in an anechoic chamber. The contractor shall measure sound levels throughout school and adjust speakers so sound levels are 20dBA above average ambient (during school hours) and less than 110dBA. Contractor shall provide measuring report stating locations, ambient sound levels, and speaker temporal sound levels. Measurements shall be take 5’-0” in front of each audible device and 25’-0” in front of each audible device.

E. The notification appliance (combination audio/visual units and visual only units) shall provide field selectable flash intensities of 15cd, 30cd, 75cd, 110cd. The appliance shall be capable of meeting the candela requirements of ADA. Provide, adjust and install audio/visual units and visual units to meet the requirements defined in Room Spacing for Wall-Mounted Visible Appliances Table and Figure in NFPA 72.

F. The appliance shall be polarized to allow for electrical supervision of the system wiring. The unit shall be provided with terminals with barriers for input/output wiring and be able to mount a single gang or double gang box or double workbox with the use of an adapter plate.

G. Power supplies and batteries shall be sized to accommodate 110cd at all strobes.

2.07 SMOKE SENSORS

A. Shall be compatible with existing fire alarm control panel as stated in the installation manual and comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems," Include the following features:
   1. Operating Voltage: 24 VDC, nominal,
   2. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation,
   3. Plug-In Arrangement: Sensor and associated electronic components are mounted in a module that connects to a fixed base with a twist-Locking plug connection. Base shall provide break-off plastic tab that can be removed to engage the head/base locking mechanism. No special tools shall be required to remove head once it has been locked. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control unit,
   4. Each sensor base shall contain) LED that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the [detector head][sensor base] LED shall be on steady.
   5. Each sensor base shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location,
   6. Each sensor shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another sensor type, Upon detection of a "wrong device", the control unit shall operate with the installed device at the default alarm settings for that sensor; 2.5% obscuration for photoelectric sensor, 135-deg F and 15-deg F rate-of-rise for the heat sensor, but shall indicate a "Wrong Device" trouble condition.
   7. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.
   8. Addressability. Sensors include a communication transmitter and receiver in the mounting base having a unique identification and capability for status reporting to the FACP. Sensor address shall be located in base to eliminate false addressing when replacing sensors.
   9. Removal of the sensor head for cleaning shall not require the setting of addresses.

B. Duct Smoke Detector: Photoelectric type, with sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied.
   1. The Duct Housing shall provide a supervised relay driver circuit for driving up to 15 relays with a single "Form C., contact rated at 7 A@ 28VDC or 10A@ 120V AC.
   2. Duct Housing shall provide a relay control trouble indicator Yellow LED.
   3. Compact Duct Housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captive fastening screws.
   4. Duct Housing shall provide two (2) Test Ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test the activation of the duct smoke detector.
   5. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover.
   6. Each duct detector shall have a Remote Test Station with an alarm LED and test switch. Duct Smoke Sensor housing shall be EST model SIGA-DH, photoelectric type with sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Provide remote alarm led inidicators SIGA-LED and/or remote test station model SD-TRK as required.
   7. Duct Housing shall provide a relay control trouble indicator Yellow LED.
      a. Compact Duct Housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captivee fastening screws.
      b. Duct Housing shall provide two (2) Test Ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test the activation of the duct smoke sensor.
      c. Duct Housing shall provide a magnetic test area and Red sensor status LED.
      d. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct: housing front cover.
      e. Each duct sensor shall have a Remote Test Station with an alarm LED and test switch.
   8. All exterior duct detectors shall be provided with compatible Weatherproof Duct Housing Enclosure.

2.08 MAGNETIC DOOR HOLDERS

A. Units shall be compatible with existing fire alarm control panel and listed to UL 228 Units are equipped for surface mounting as indicated and are complete with matching doorplate. Unit shall operate from a 120VAC, 24VAC. 24VDC source and develops a minimum of 25 lbs. holding force.

2.09 BEAM SMOKE DETECTORS

A. Shall be compatible with existing fire alarm control panel.

B. Reflective Beam Smoke Detector shall be mnounted at 1'-0" below ceiling at locations specified on drawings.

C. Reflective prism shall be mounted as per manufacturer's requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

A. No installation shall begin without approved plans from the fire marshal or AHJ.

B. The entire system shall be installed in a workmanlike manner, in accordance with approved manufacturer's wiring diagrams. The Contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation.

C. All penetrations of floor slabs and fire walls shall be fire stopped in accordance with all local fire codes.

D. End of Line Devices (Resistors/Diodes/Capacitors): Shall be furnished as required for mounting as directed by the manufacturer.

E. All wiring shall be color coded throughout, to National Electrical Code standards and a minimum of No. 18 AWG., unless otherwise noted. All wiring shall be of the type recommended by the manufacturer.

F. All wires shall test free from grounds or crosses between conductors.

G. Fire alarm system terminal and junction locations shall be identified in accordance with NFPA Standard 70, Section 760-3. Terminal and junction boxes shall be painted red and stenciled in white letters "FIRE ALARM", preventing unintentional interference with the fire alarm system wiring during testing, servicing and additional modifications to the system.

H. All final connections between system equipment and the wiring shall be made under the supervision of a trained manufacturer's technical representative.

I. The contractor shall submit to the Authority Having Jurisdiction (AHJ), all necessary drawings and equipment specifications required for a complete AHJ approved system. Drawings shall be prepared by the Contractor.

J. The Contractor shall have a licensed New York State Professional Engineer Stamp all drawings and applications. Pay for all fees to obtain all necessary permits.

K. All junction boxes housing relays must be labeled with P-Touch type labeler with relay point number and device it serves, i.e. (0001-Flow Switch 1).

L. Contractor to review points list prior to programming with Owner. Contractor only to program approved points list. Any changes to program not previously approved by Owner will be done at Contractor’s expense.

3.02 CLEAN UP

A. Upon completion of the installation, all debris created by the installation shall be removed from the premises or disposed of as directed by the Owner.

B. 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 engineer, owner or AHJ, the installing contractor shall be responsible for the clearing of all devices prior to final acceptance.

3.03 TESTS

A. Prior to the final acceptance test, the Contractor and a trained manufacturer's technical representative shall test the completed system for proper operation. The system shall be demonstrated to perform all of the functions as below listed in 3.04 C. Any system, equipment or wiring failures discovered during said test shall be repaired or replaced before requesting scheduling of the final acceptance test.

B. The system shall be tested for final acceptance in the presence of the Owner's representative, Architect's representative, Engineer's representative, the local Code enforcement official, Contractor's representative and the Manufacturer's representative.

C. During the final acceptance test:
   1. Every smoke detector, heat detector and carbon monoxide detector shall be tested.
   2. Every audible alarm signaling device shall be sounded.
   3. Every visual alarm signaling device shall be lit or flashed.
   4. Confirm central station alarm monitoring receives signal.

D. Upon successful completion of all final acceptance tests, the Contractor's and Manufacturer's representatives shall each author and sign a letter confirming the successful completion of testing. Two (2) copies of each letter shall be forwarded to the Owner's representative, the Architect's representative, the Engineer's representative and the local Code enforcement official.

E. All final acceptance testing shall be done at a time convenient to the local Code enforcement official and the Owner's representatives and all testing costs shall be born by the Contractor as part of this Contract.

3.04 DOCUMENTATION AND TRAINING

A. The Contractor shall provide the services of a trained manufacturer's employee for a period of two (2) hours, during normal business hours, to instruct the Owner's designated personnel on the operation and maintenance of the entire system.

3.05 MAINTENANCE AND TESTING AGREEMENT

A. The equipment manufacturer shall provide to the Owner a price quotation for a one (1) year fire alarm system maintenance and testing agreement to begin upon final acceptance of the system. System Supplier shall have a local service organization with a minimum of 20 factory trained technicians. Technicians shall be NICET Level 2 certified.

3.06 SERVICE AND MAINTENANCE

A. The equipment manufacturer shall make available a fully equipped service organization, capable of guaranteeing an on-site service response time within eight (8) hours to a service request call. Said service shall be available twenty-four (24) hours per day and seven (7) days per week.

B. The equipment manufacturer shall make available, to the Owner, a price quotation for a one (1) year maintenance and testing agreement, to take effect on the date of final acceptance

3.07 GUARANTEE

A. The Contractor shall guarantee all wiring and equipment to be free from inherent mechanical and electrical defects for one (1) year. Manufacturer shall make available to the Owner a local service department, which shall stock standard parts on the premises. Maintenance is to be provided during normal working hours, at no cost to the owner, for a period of twelve (12) months from the date of acceptance of the installation, unless damage is caused by misuse, abuse or accident.

END OF SECTION

January 2, 2025

Adam Rubin
Director of Facilities
Port Chester-Rye Union Free School District
113 Bowman Avenue
Rye Brook, NY 10573

Subject: **Report for Limited Asbestos Survey Services**
Port Chester Middle School
113 Bowman Avenue
Rye Brook, NY 10573

Dear Mr. Rubin:

Langan has completed limited asbestos materials testing at Port Chester Middle School in the Auditorium. Drew Cheskin, a DOL Licensed Asbestos Inspector (#24-61X9V-SHAB), conducted sampling on December 19th, 2024. The survey included visual observation, friability and condition assessment, material sampling, and laboratory sample analysis of suspect Asbestos-Containing Materials (ACM) that may be affected by replacement of auditorium flooring and seating. Langan inspected the following suspect materials to address specific concerns and suspect materials to be impacted by the upcoming project:

Location(s)	Functional Space	Material Description	No. of Samples	Condition & Friability	Asbestos Results	Quantity
Auditorium	**2030**	**9" x 9" Floor Tile**	**N/A**	**Good Non-Friable**	**ACM per AHERA**	**3000 SF**
		9" x 9" Floor Tile Mastic	**2**	**Good Non-Friable**	**1.8% Chrysotile**	

Note(s): All quantities are an estimate and MUST be confirmed by contractor during the contractor walkthrough.
NAD = No Asbestos Detected
Asbestos Materials in BOLD

It is our hope that the information provided in this letter has met the project requirements. Thank you for the opportunity to provide you and your staff with our continued services. Please contact me at via email or 917-696-6972 if you have any questions or require any additional information.

Sincerely,

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.

Drew Cheskin
Project Scientist

Enclosure(s): Bulk Sample Lab Results
Asbestos Sample Location Plan
Company and Personnel Certification

Bulk Sample Laboratory Results & Asbestos Sample Location Plan

AmeriSci New York
117 EAST 30TH ST.
NEW YORK, NY 10016
TEL: (212) 679-8600 • FAX: (212) 679-3114

PLM Bulk Asbestos Report

Langan Engineering & Environmental Servic
Attn: Vijay Patel
300 Kimball Drive
4th Floor
Parsippany, NJ 07054

Date Received 12/23/2024 **AmeriSci Job #** 224122712
Date Examined 12/27/24 **P.O. #**
ELAP # 11480 **Page** 1 **of** 1
RE: 101134205; Port Chester MS Auditorium; 113 Bowman Ave. Rye Brook, NY 10573

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos	Notes
FTM-1A 1	224122712-01	***Yes***	Inconclusive - Trace Chrysotile detected at 1% or less (NOB by EPA 600/M4-82-020) by Khaalid W. Perine on 12/27/24	*1*
Location: Auditorium - 9 x 9 Floor Tile Mastic **Analyst Description:** Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <0.3 % pc **Other Material:** Non-fibrous 12%				
FTM-1B 1	224122712-02	***Yes***	Inconclusive - Trace Chrysotile detected at 1% or less (NOB by EPA 600/M4-82-020) by Khaalid W. Perine on 12/27/24	*1*
Location: Auditorium - 9 x 9 Floor Tile Mastic **Analyst Description:** Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <0.3 % pc **Other Material:** Non-fibrous 9.3%				

Reporting Notes:

(1) Trace <1% results by NYS 198.6 are inconclusive and are not considered non-ACM

Analyzed by: Khaalid W. Perine
Date: 12/27/2024

Reviewed by: Khaalid W. Perine

*NAD/NSD =no asbestos detected; NA =not analyzed; NA/PS=not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM Bulk Asbestos Analysis using Nikon , Model Labophot Pol, Microscope, Serial #: 952062, by Appd E to Subpt E, 40 CFR 763 quantified by either CVES or 400 pt ct as noted for each analysis (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite, or ELAP 198.6 for NOB samples, or EPA 400 pt ct by EPA 600-M4-82-020 (NY ELAP Lab 11480); Note:PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non asbestos-containing in NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab.This PLM report relates ONLY to the items tested. RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054, NJ Lab ID #NY031.

END OF REPORT

Client Name: Langan Engineering & Environmental Services

Table I
Summary of Bulk Asbestos Analysis Results by NYS ELAP 198.4

101134205; Port Chester MS Auditorium; 113 Bowman Ave. Rye Brook, NY 10573

AmeriSci Sample #	Client Sample#	HG Area	NOB Sample Weight (gram)	NOB Heat Sensitive Organic %	NOB Acid Soluble Inorganic %	NOB Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
01	FTM-1A	1	0.114	78.3	9.4	10.4	Chrysotile <0.3	Chrysotile 1.8
Location:	Auditorium - 9 x 9 Floor Tile Mastic							
02	FTM-1B	1	0.066	78.2	12.5	9.3	Chrysotile <0.3	NA/PS
Location:	Auditorium - 9 x 9 Floor Tile Mastic							

Analyzed by: Khaalid W. Perine

Date: 12/27/2024

Reviewed by: Khaalid W. Perine

**Quantitative Analysis (Semi/Full); Bulk Asbestos Analysis - PLM by Appd E to Subpt E, 40 CFR 763 or NYSDOH ELAP 198.1 for New York friable samples or NYSDOH ELAP 198.6 for New York NOB samples; TEM (Semi/Full) by EPA 600/R-93/116 (or NYSDOH ELAP 198.4; for New York samples). Analysis using Hitachi, Model H7000-Noran 7 System, Microscope, Serial #: 747-05-06. NAD = no asbestos detected during a quantitative analysis; NA = not analyzed; Trace = <1%; (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only; Qualitative Analysis: Asbestos analysis results of "Present" or "NVA = No Visible Asbestos" represents results for Qualitative PLM or TEM Analysis only (no accreditation coverage available from any regulatory agency for qualitative analyses): NVLAP (PLM) 200546-0, NYSDOH ELAP Lab 11480, NJ Lab ID #NY031.

Warning Note: PLM limitation, only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris for which PLM evaluation is recommended (i.e. soils and other heterogenous materials).

LANGAN

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

300 Kimball Drive
Parsippany, NJ 07054
Phone: 973-560-4900
Fax: 973-560-4901

#224122712

Page 1 of 1

Project Name:	Port Chester MS Auditorium		
Address:	113 Bowman Ave Rye Brook, NY 10573	Auth. By:	Craig Napolitano
		Phone No:	646-210-6500
Langan Job No.:	101134205	Sampling Date:	12/19/24
Sampled By/License #:	Drew Cheskin 24-61X9V-SHAB		

Sample ID Number	Description of Sample	Sample Location	Analysis Requested for Asbestos: PLM	PLM-NOB	TEM	Analysis Requested for Lead: AAS	TCLP	Analysis Requested for PCB: EPA Method 8082	Results
FTM-1A	9x9 Floor Tile Mastic	Auditorium		✓	✓				
FTM-1B	↓	↓		✓	✓				

Total No. of Samples: 2

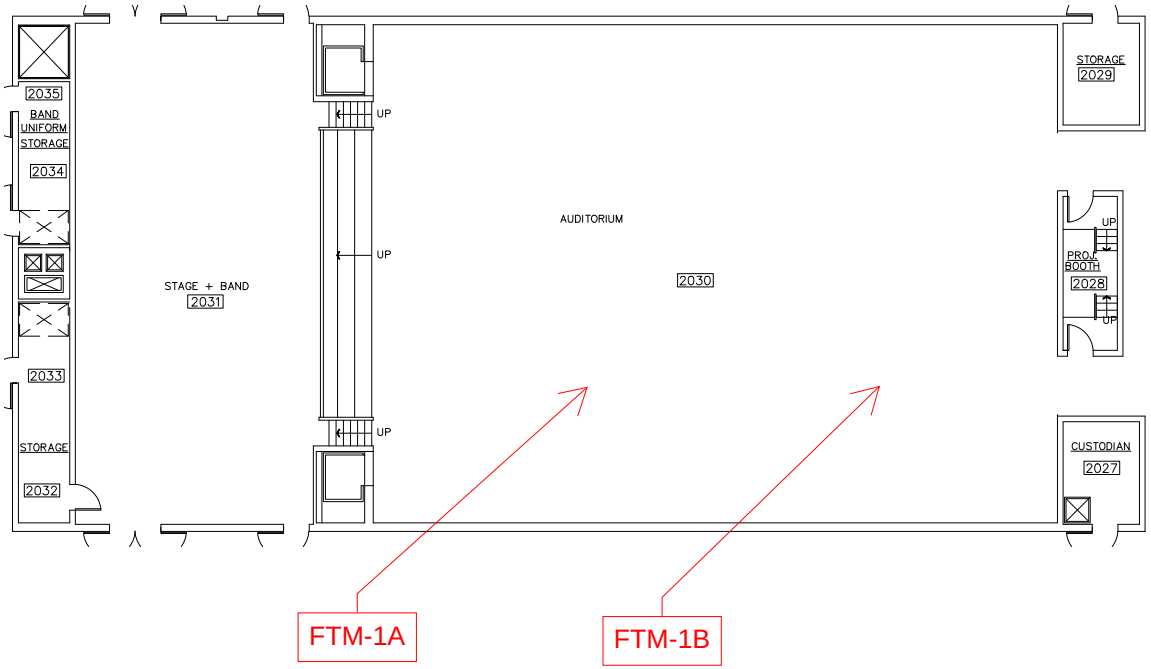
Turnaround Request:

6 hours	12 hours	24 hours	48 hours	72 hours	5 days
				✓	

Laboratory Instructions: Stop analysis @ 1st positive (>1% by weight) for each homogenous sample group. Please e-mail results to dcheskin@langan.com, cnapolitano@langan.com, bfuery@langan.com.

Relinquished By: Drew Cheskin	Date: 12/23/24	Time:	Received by: [signature]	Date: 12/23/24	Time: 17:00
Relinquished By:	Date:	Time:	Received by:	Date:	Time:
Sampling Company: LANGAN			Receiving Laboratory:		

NOTES:



Asbestos-Containing Material

Non Asbestos-Containing Material

GENERAL NOTES:

A. THIS PLAN IS PROVIDED TO SHOW APPROXIMATE SAMPLING LOCATIONS. THE ACTUAL LAYOUT OF THE BUILDING AND BUILDING EQUIPMENT MAY BE SLIGHTLY DIFFERENT THAN SHOWN.

LANGAN
Langan Engineering and Environmental Services, Inc.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ Certificate of Authorization No.24GA27996400

Project
Port Chester Middle School

Drawing Title
ASBESTOS SAMPLING LOCATIONS

Project No. 101134205
Date 01/02/2024
Drawn By D. Cheskin
Checked By C. Napolitano

Drawing No. **ASL-01**
Sheet 1 of 1

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Company and Personnel Certifications

WE ARE YOUR DOL

NEW YORK STATE | Department of Labor

DIVISION OF SAFETY & HEALTH LICENSE AND CERTIFICATE UNIT, STATE OFFICE CAMPUS, BLDG. 12, ALBANY, NY 12226

ASBESTOS HANDLING LICENSE

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive, 4th Floor, Parsippany, NJ, 07054

License Number: 70336
License Class: RESTRICTED
Date of Issue: 03/04/2024
Expiration Date: 03/31/2025
Duly Authorized Representative: Craig Napolitano

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

Amy Phillips, Director
For the Commissioner of Labor

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE



ANDREW CHESKIN
CLASS(EXPIRES)
C ATEC (09/25) D INSP (09/25)
E MGPL (09/25) H PM (09/25)
I PD (09/25)

CERT# 24-61X9V-SHAB
DMV# 304231776

MUST BE CARRIED ON ASBESTOS PROJECTS

NEW YORK STATE OF OPPORTUNITY. | Department of Health

KATHY HOCHUL
Governor

JAMES V. McDONALD, M.D., M.P.H.
Commissioner

JOHANNE E. MORNE, M.S.
Executive Deputy Commissioner

LAB ID: 11480

April 01, 2024

MS. KAROL H. LU
AMERICA SCIENCE TEAM NEW YORK, INC
117 EAST 30TH ST
NEW YORK, NY 10016

Certificate Expiration Date:
April 01, 2025

Dear Ms. Lu,

Enclosed are certificate(s) of approval issued to your environmental laboratory for the current permit year. The certificate(s) supersede(s) any previously issued one(s) and is(are) in effect through the expiration date listed. Please carefully examine the certificate(s) to insure that the categories, subcategories, analytes, and methods for which your laboratory is approved are correct. In addition, verify that your laboratory's name, address, lead technical director, and identification number are accurate.

Pursuant to NYCRR Subpart 55-2.2, original certificates must be posted conspicuously in the laboratory and copies shall be made available to any client of the laboratory upon request.

Pursuant to NYCRR Subpart 55-2.6, any misrepresentation of the fields of accreditation (category - method - analyte) for which your laboratory is approved may result in denial, suspension, or revocation of your certification. Any use of the Environmental Laboratory Approval Program (ELAP) or National Environmental Laboratory Accreditation Program (NELAP) name, reference to the laboratory's approval status, and/or using the NELAP logo in any catalogs, advertising, business solicitations, proposals, quotations, laboratory analytical reports, or other materials must include the laboratory's ELAP identification number and distinguish between testing for which the laboratory is approved and testing for which the laboratory is not approved.

If you have any questions, please contact us at the Environmental Laboratory Approval Program, Wadsworth Center, New York State Department of Health, Empire State Plaza, Albany NY, 12237; by phone at (518) 485-5570; by facsimile at (518) 485-5568; and by email at elap@health.ny.gov.

Sincerely,

Amy J. Steuerwald

Amy J. Steuerwald, Ph.D.
Director, Environmental Laboratory Approval Program

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. KAROL H. LU
AMERICA SCIENCE TEAM NEW YORK, INC
117 EAST 30TH ST
NEW YORK, NY 10016

NY Lab Id No: 11480

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

Serial No.: 68795

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200546-0

AmeriSci New York

New York, NY

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique on ISO/IEC 17025).

2024-07-01 through 2025-06-30

Effective Dates

For the National Voluntary Laboratory Accreditation Program

National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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ASBESTOS FIBER ANALYSIS **NVLAP LAB CODE 200546-0**

Bulk Asbestos Analysis

Code	*Description*
18/A01	EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

Code	*Description*
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.

For the National Voluntary Laboratory Accreditation Program

Port Chester Public Schools

Six Month AHERA Surveillance

Port Chester Middle School

January 2023

ENVIROSCIENCE CONSULTANTS
A Mainline Company

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Ronkonkoma, NY 11779
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Project #23111

Six Month AHERA Surveillance

Performed at

Port Chester Middle School
113 Bowman Avenue
Rye Brook, NY 10573

for

Port Chester Public Schools
113 Bowman Avenue
Rye Brook, NY 10573

January 2023

Prepared by:

Enviroscience Consultants, Inc.
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Project #23111

Inspector & Management Planner:

Bartley Gallagher NYSDOL #92-13892

Inspector: Drew Cheskin NYSDOL #05-04280

Six Month AHERA Surveillance

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I. Summary

A six month AHERA surveillance for Port Chester Middle School of Port Chester Public Schools was performed by Mr. Drew Cheskin of Enviroscience Consultants on January 10, 2023.

The six month surveillance was performed in full accordance with the Asbestos Hazard Emergency Response Act (AHERA) regulations. Mr. Cheskin is a certified AHERA Inspector.

Mr. Cheskin performed the on-site investigation, which included examining existing ACBM, evaluating the condition of the ACBM, and determining if originally non-friable materials have become friable. The physical condition of most of the ACBM found in this building did not change.

After studying the inspection reports, Mr. Bartley M. Gallagher, a certified EPA/AHERA Inspector and Management Planner, developed the recommendations for response actions depending on his evaluation of the hazard that each material may cause.

An Inventory of Asbestos Containing Materials by location, including the AHERA Functional Space identification number is in Appendix B. This inventory includes the material, quantity, amount damaged, the hazard level, the AHERA Reassessment category, and recommended response actions. A remarks column includes sampling and abatement action and other pertinent information.

Floor plans correlating the AHERA Functional Space ID number with the current common location names are in Appendix C.

II. Inspection and Recommendations

The inspector entered all accessible spaces to inspect and physically assess the condition and friability of all previously known or assumed ACBM. The inspector noted any change in condition of remaining materials, materials that have been abated since the last reinspection, and any materials that were either not identified, or may have been improperly classified.

Unless otherwise stated, a recommendation for removal is a suggestion that the materials be removed as soon as the school's budget will allow.

During this inspection there was damage noted, repairs should be made. Please reference your Summary of Damaged Asbestos Containing Materials found in Appendix A.

Since the last Triennial Reinspection, no survey or abatement activities have been performed.

History:

Any damaged material that is assumed to be asbestos containing should be sampled to confirm that it is identified as ACBM before initiating repair procedures.

The inspector did not access any flooring materials located under carpeting or new tiles because obtaining access would damage the carpet or new tiles. Prior to disturbing any carpets or removing new floor tiles, the school should ascertain whether floor tiles are located beneath them. Repair or replace damaged floor tiles as noted. We have prepared an inventory of asbestos containing materials for the building. These pages list the current damage category, changes in physical condition, current priority levels, changes in response actions, and bulk sampling and abatement information (see Appendix B).

All materials are currently classified as non-friable in their present condition.

III. Bulk Sampling Protocol

Thermal System Insulation - Three (3) samples are randomly collected for each homogeneous material of Thermal System Insulation (TSI). AHERA states that for each area of patched TSI at least one (1) sample be collected.

Surfacing Materials - a minimum of three (3), five (5) or seven (7) samples based upon the amount of suspect material present.

Miscellaneous Materials - require a minimum of two (2) samples.

New York State Revisions to Analytical Methods

Over the years, the New York State Department of Health has made several revisions to testing requirements that affect suspect asbestos materials in school buildings. These changes have resulted in the requirement to re-sample and analyze certain materials to comply with the revised analytical methods:

Surfacing Materials - In May 2016, the New York State Department of Health (NYSDOH) finalized testing requirements and approved a new analytical method for analysis of surfacing materials that contain vermiculite. Surfacing materials that could contain vermiculite include spray-on fireproofing, wall plaster, and ceiling plaster. Unfortunately, the previous analysis method for fireproofing and plasters did not specifically require that the vermiculite percentage be reported. The District must now consider any spray or troweled fireproofing or plaster materials to be presumed asbestos containing materials (PACM) until they are re-tested to conform to the new requirements. As a result, we have added any plaster previously classified as non-asbestos to the Inventory of Asbestos Containing Materials. Re-testing of any fireproofing or plaster materials will be noted in the narrative and will be shown in the Inventory.

Ceiling Tile - In August 2012, the New York State Department of Health stated that Transmission Electron Microscopy (TEM) is the only reliable method for identifying asbestos fibers in ceiling tiles that contain cellulose. Any ceiling tiles that have not been analyzed and found negative using TEM methods must be classified as ACM unless the District has documentation that they are non-ACM. Any re-testing of ceiling tiles will be noted in the narrative and will be shown in the Inventory. The District should keep records for any new non-asbestos ceiling tiles that are installed, including the location, brand, model number, date of manufacture, and date of installation.

Floor Tile and Other NOB Materials - In 1992, the New York State Department of Health stated that Transmission Electron Microscopy (TEM) is the only reliable method for identifying asbestos fibers in non-friable organically bound (NOB) materials such as floor tiles and roofing materials. As such, any floor tiles and mastic which have not been analyzed and found negative using TEM methods must be classified as ACM unless the District has documentation that they are non-ACM. Re-testing of any floor tile, mastic or other NOB materials will be noted in the narrative and will be shown in the Inventory.

No bulk samples were collected during this surveillance.

IV. Hazard Rank Determination

For each homogeneous material, a response action priority level is determined depending on its physical condition, location, and potential for future damage. Materials were classified into seven categories, based upon the type, condition, and potential for damage of the ACBM. The categories are as follows:

Hazard Rank	ACBM Condition	ACBM Disturbance Potential
1	Significantly Damaged	Any Potential for Damage
2	Damaged	Potential for Significant Damage
3	Damaged	Potential for Damage
4	Damaged	Low Potential for Damage
5	Good	Potential for Significant Damage
6	Good	Potential for Damage
7	Good	Low Potential for Damage

The district shall select and implement in a timely manner the appropriate response actions consistent with the assessment category. The response actions selected shall be sufficient to protect human health and the environment. The district may then select, from the response actions which protect human health and the environment, that action which is the least burdensome method. Nothing in this section shall be construed to prohibit removal of ACBM from a school building at any time, should removal be the preferred response action of the district.

If damaged or significantly damaged thermal system insulation ACM is present in a building, the district shall:

(1) At least repair the damaged area.
(2) Remove the damaged material if it is not feasible, due to technological factors, to repair the damage.
(3) Maintain all thermal system insulation ACM and its covering in an intact state and undamaged condition.

If damaged friable surfacing ACM or damaged friable miscellaneous ACM is present in a building, the district shall select from among the following response actions: encapsulation, enclosure, removal, or repair of the damaged material.

In selecting the response action from among those which meet the definitional standards in §763.83, the district shall determine which of these response actions protects human health and the environment. For purposes of determining which of these response actions are the least burdensome, the district may then consider local circumstances, including occupancy and use patterns within the school building, and its economic concerns, including short and long-term costs.

V. AHERA Reassessment Category

The Management Planner is also required to classify each friable and thermal system insulation (TSI) ACBM and suspected ACBM assumed to be ACM in the school building into one of the following AHERA 1 through 7 reassessment categories based on damage, potential for damage, and material category:

(1) Damaged or significantly damaged thermal system insulation ACM.
(2) Damaged friable surfacing ACM.
(3) Significantly damaged friable surfacing ACM.
(4) Damaged or significantly damaged friable miscellaneous ACM.
(5) ACBM with potential for damage.
(6) ACBM with potential for significant damage.
(7) Any remaining friable ACBM or friable suspected ACBM.
N/A Not Applicable

Appendix A

INVENTORY OF DAMAGED ASBESTOS CONTAINING MATERIALS

Space No.	Location	Material Description	HA/USA	Quantity	Amount Damaged	Hazard Rank	AHERA Reassessment Category	Response Action	Remarks
1027	107.07	9" x 9" Floor tile	FT	120 SF	4 SF	4	N/A Non Friable	Repair	damaged tiles
1028	107.03	12" x 12" Floor tile	FT	80 SF	3 SF	4	N/A Non Friable	Repair	damaged tiles
1063	103	9" x 9" Floor tile	FT	830 SF	3 SF	4	N/A Non Friable	Repair	damaged tiles
1077	123 closet - L	9" x 9" Floor tile	FT	10 SF	1 SF	4	N/A Non Friable	Repair	damaged tiles
1088	106	9" x 9" Floor tile	FT	1100 SF	2 SF	4	N/A Non Friable	Repair	damaged tiles
1113	117	9" x 9" Floor tile	FT	900 SF	2 SF	4	N/A Non Friable	Repair	Damaged tiles
2038	201	9" x 9" Floor tile	FT	325 SF	1 SF	4	N/A Non Friable	Repair	damaged tiles
2059	208.2	9" x 9" Floor tile	FT	300 SF	1 SF	4	N/A Non Friable	Repair	damaged tiles
2150	cafeteria #1 & hallway	9" x 9" Floor tile	FT	3200 SF	1 SF	4	N/A Non Friable	Repair	damaged tiles. one tile missing.
3066	312	9" x 9" Floor tile	FT	900 SF	1 SF	4	N/A Non Friable	Repair	damaged tiles

Appendix B

INVENTORY OF ASBESTOS CONTAINING MATERIALS

Space No.	Location	Material Description	HA/USA	Quantity	Amount Damaged	Hazard Rank	AHERA Reassessment Category	Response Action	Remarks
1000	Throughout	joint compound	JC	unknown	0	7	7	O&M	Good condition
1004	custodians lockers	9" x 9" Floor tile	FT	100 SF	0	7	N/A Non Friable	O&M	Good condition
1010	137.1	9" x 9" Floor tile	FT	200 SF	0	7	N/A Non Friable	O&M	Good condition
1011	137.2	9" x 9" Floor tile	FT	70 SF	0	7	N/A Non Friable	O&M	Good condition
1012	137.3	9" x 9" Floor tile	FT	50 sf	0	7	N/A Non Friable	O&M	Good condition
1013	hall closet	9" x 9" Floor tile	FT	15 sf	0	7	N/A Non Friable	O&M	Good condition
1017	150	9" x 9" Floor tile	FT	1500 sf	0	7	N/A Non Friable	O&M	Good condition
1018	101.1 & 107.2	9" x 9" Floor tile	FT	200 sf	0	7	N/A Non Friable	O&M	under carpet good condition
1022	107.1	9" x 9" Floor tile	FT	75 sf	0	7	N/A Non Friable	O&M	under carpet good condition
1027	107.07	9" x 9" Floor tile	FT	120 sf	4 sf	4	N/A Non Friable	Repair	damaged tiles
1028	107.03	12" x 12" Floor tile	FT	80 sf	3 SF	4	N/A Non Friable	Repair	damaged tiles
1029	107.04	9" x 9" Floor tile	FT	80 sf	0	7	N/A Non Friable	O&M	under carpet good condition
1030	107.06	9" x 9" Floor tile	FT	0 SF	0	7	N/A Non Friable	O&M	abated previously per ray renda
1031	112	9" x 9" Floor tile	FT	180 sf	0	7	N/A Non Friable	O&M	under carpet good condition
1044	154	9" x 9" Floor tile	FT	25 sf	0	7	N/A Non Friable	O&M	Good condition
1051	101	9" x 9" Floor tile	FT	830 sf	0	7	N/A Non Friable	O&M	Good condition
1053	101 closet	9" x 9" Floor tile	FT	10 sf	0	7	N/A Non Friable	O&M	Good condition
1054	101.3 closet	9" x 9" Floor tile	FT	10 sf	0	7	N/A Non Friable	O&M	Good condition
1058	102 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
1059	102 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
1060	102	9" x 9" Floor tile	FT	830 SF	0	7	N/A Non Friable	O&M	Good condition
1061	103 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
1062	103 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition

Space No.	Location	Material Description	HA/USA	Quantity	Amount Damaged	Hazard Rank	AHERA Reassessment Category	Response Action	Remarks
1063	103	9" x 9" Floor tile	FT	830 SF	3 SF	4	N/A Non Friable	Repair	damaged tiles
1064	104 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
1065	104 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
1066	104	9" x 9" Floor tile	FT	830 SF	0	7	N/A Non Friable	O&M	Good condition
1076	123 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition. Two tiles missing.
1077	123 closet - L	9" x 9" Floor tile	FT	10 SF	1 SF	4	N/A Non Friable	Repair	damaged tiles
1078	123	9" x 9" Floor tile	FT	830 SF	0	7	N/A Non Friable	O&M	Good condition
1079	122 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
1080	122 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
1081	122	9" x 9" Floor tile	FT	830 SF	0	7	N/A Non Friable	O&M	Good condition
1084	121	9" x 9" Floor tile	FT	1270 SF	0	7	N/A Non Friable	O&M	Good condition
1084A	121 Storage Closet	9" x 9" Floor tile	FT	80 SF	0	7	N/A Non Friable	O&M	Good condition
1085	120	9" x 9" Floor tile	FT	960 SF	0	7	N/A Non Friable	O&M	Good condition
1086	119	9" x 9" Floor tile	FT	1270 SF	0	7	N/A Non Friable	O&M	Good condition
1088	106	9" x 9" Floor tile	FT	1100 SF	2 SF	4	N/A Non Friable	Repair	damaged tiles
1089	107	9" x 9" Floor tile	FT	1100 SF	0	7	N/A Non Friable	O&M	Good condition
1090	108 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
1091	108 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
1092	108	9" x 9" Floor tile	FT	875 SF	0	7	N/A Non Friable	O&M	Good condition
1093	109 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
1094	109 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
1095	109	9" x 9" Floor tile	FT	875 SF	0	7	N/A Non Friable	O&M	Good condition
1096	110 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
1097	110 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
1099	110	9" x 9" Floor tile	FT	875 SF	0	7	N/A Non Friable	O&M	Good condition

Space No.	Location	Material Description	HA/USA	Quantity	Amount Damaged	Hazard Rank	AHERA Reassessment Category	Response Action	Remarks
1108	118 closet - r	9" x 9" Floor tile	ft	10 SF	0	7	N/A Non Friable	O&M	Good condition
1109	118 closet - l	9" x 9" Floor tile	ft	10 SF	0	7	N/A Non Friable	O&M	Good condition
1110	118	9" x 9" Floor tile	ft	900 SF	0	7	N/A Non Friable	O&M	Good condition
1111	117 closet - r	9" x 9" Floor tile	ft	10 SF	0	7	N/A Non Friable	O&M	Good condition
1112	117 closet - l	9" x 9" Floor tile	ft	10 SF	0	7	N/A Non Friable	O&M	Good condition
1113	117	9" x 9" Floor tile	ft	900 SF	2 sf	4	N/A Non Friable	Repair	Damaged tiles
1114	116 closet - r	9" x 9" Floor tile	ft	10 SF	0	7	N/A Non Friable	O&M	Good condition
1115	116 closet - l	9" x 9" Floor tile	ft	10 SF	0	7	N/A Non Friable	O&M	Good condition
1116	116 closet - l	9" x 9" Floor tile	ft	900 SF	0	7	N/A Non Friable	O&M	Good condition
1121	111.2	9" x 9" Floor tile	ft	140 sf	0	7	N/A Non Friable	O&M	12"x12" Beige Observed. Same as space 1120, which is not noted as having ACM tile Good condition
2001	se corridor	9" x 9" Floor tile	ft	1750 sf	0	7	N/A Non Friable	O&M	Good condition
2030	auditorium	9" x 9" Floor tile	ft	3000 sf	0	7	N/A Non Friable	O&M	good condition nine missing tiles
2034 & 2035	210.1	9" x 9" Floor tile	ft	50 sf	0	7	N/A Non Friable	O&M	Good condition
2036	s corridor	9" x 9" Floor tile	ft	850 sf	0	7	N/A Non Friable	O&M	Good condition
2037	sw corridor	9" x 9" Floor tile	ft	1150 sf	0	7	N/A Non Friable	O&M	Good condition
2038	201	9" x 9" Floor tile	ft	325 sf	1 sf	4	N/A Non Friable	Repair	damaged tiles
2042	204 closet	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
2043	204	9" x 9" Floor tile	ft	850 sf	0	7	N/A Non Friable	O&M	Good condition
2044	205 closet	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
2045	205	9" x 9" Floor tile	ft	850 sf	0	7	N/A Non Friable	O&M	Good condition
2046	206 closet	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
2047	206	9" x 9" Floor tile	ft	850 sf	0	7	N/A Non Friable	O&M	Good condition

Space No.	Location	Material Description	HA/USA	Quantity	Amount Damaged	Hazard Rank	AHERA Reassessment Category	Response Action	Remarks
2049	207	9" x 9" Floor tile	FT	480 SF	0	7	N/A Non Friable	O&M	Good condition
2050	207.4	9" x 9" Floor tile	FT	85 SF	0	7	N/A Non Friable	O&M	Good condition
2053	207.3	9" x 9" Floor tile	FT	85 SF	0	7	N/A Non Friable	O&M	Good condition
2054	207.1	9" x 9" Floor tile	FT	120 SF	0	7	N/A Non Friable	O&M	Good condition
2055	207.5	9" x 9" Floor tile	FT	85 SF	0	7	N/A Non Friable	O&M	Good condition
2056	207.2	9" x 9" Floor tile	FT	175 SF	0	7	N/A Non Friable	O&M	Good condition
2058	208.1	9" x 9" Floor tile	FT	150 SF	0	7	N/A Non Friable	O&M	Good condition
2059	208.2	9" x 9" Floor tile	FT	300 SF	1 SF	4	N/A Non Friable	Repair	damaged tiles
2060	208.3	9" x 9" Floor tile	FT	100	0	7	N/A Non Friable	O&M	Good condition
2061	208.4	9" x 9" Floor tile	FT	80 SF	0	7	N/A Non Friable	O&M	Good condition
2062	208.5	9" x 9" Floor tile	FT	125 SF	0	7	N/A Non Friable	O&M	Good condition
2063	208	9" x 9" Floor tile	FT	300 SF	0	7	N/A Non Friable	O&M	Good condition
2064	passage	9" x 9" Floor tile	FT	100 SF	0	7	N/A Non Friable	O&M	Good condition
2068	209	9" x 9" Floor tile	FT	100 SF	0	7	N/A Non Friable	O&M	Good condition
2069	209.1	9" x 9" Floor tile	FT	115 SF	0	7	N/A Non Friable	O&M	Good condition
2070 & 2071	210.1	9" x 9" Floor tile	FT	330 SF	0	7	N/A Non Friable	O&M	Good condition
2072	office Closet A	9" x 9" Floor tile	FT	25 SF	0	7	N/A Non Friable	O&M	Good condition
2073	office closet B	9" x 9" Floor tile	FT	25 SF	0	7	N/A Non Friable	O&M	Good condition
2074	210.2	9" x 9" Floor tile	FT	50 SF	0	7	N/A Non Friable	O&M	Good condition
2075	210.3	9" x 9" Floor tile	FT	80 SF	0	7	N/A Non Friable	O&M	Good condition
2076	210	9" x 9" Floor tile	FT	300 SF	0	7	N/A Non Friable	O&M	Good condition
2083	227 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
2084	227 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
2085	227	9" x 9" Floor tile	FT	890 SF	0	7	N/A Non Friable	O&M	Good condition
2086	226 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition

Space No.	Location	Material Description	HA/USA	Quantity	Amount Damaged	Hazard Rank	AHERA Reassessment Category	Response Action	Remarks
2087	226 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
2088	226	9" x 9" Floor tile	ft	890 sf	0	7	N/A Non Friable	O&M	Good condition
2089	225 closet - l	12" x 12" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	inaccessible. Assumed to have same 12" x 12" as classroom. Classroom tile not listed as acm.
2090	225 closet - r	12" x 12" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	same 12" x 12" as classroom. Classroom tile not listed as acm. Good condition
2091A	225 storage	9" x 9" Floor tile	ft	100 sf	0	7	N/A Non Friable	O&M	Good condition
2099	212	12" x 12" Floor tile	ft	1190 sf	0	7	N/A Non Friable	O&M	Good condition
2101	213.1 storage	9" x 9" Floor tile	ft	80 sf	0	7	N/A Non Friable	O&M	Good condition
2105	230.1	9" x 9" Floor tile	ft	175 sf	0	7	N/A Non Friable	O&M	Good condition
2106	230.2	9" x 9" Floor tile	ft	110 sf	0	7	N/A Non Friable	O&M	Good condition
2107	231.1 closet	9" x 9" Floor tile	ft	5 sf	0	7	N/A Non Friable	O&M	Good condition
2110	214 closet - l	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
2111	214 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
2112	214	9" x 9" Floor tile	ft	900 sf	0	7	N/A Non Friable	O&M	Good condition
2113	215 closet - l	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
2114	215 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
2115	215	9" x 9" Floor tile	ft	900 sf	0	7	N/A Non Friable	O&M	Good condition
2116	216 closet - l	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
2117	216 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
2118	216	9" x 9" Floor tile	ft	900 sf	0	7	N/A Non Friable	O&M	Good condition
2127	223 closet - l	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
2128	223 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition. One tile missing.

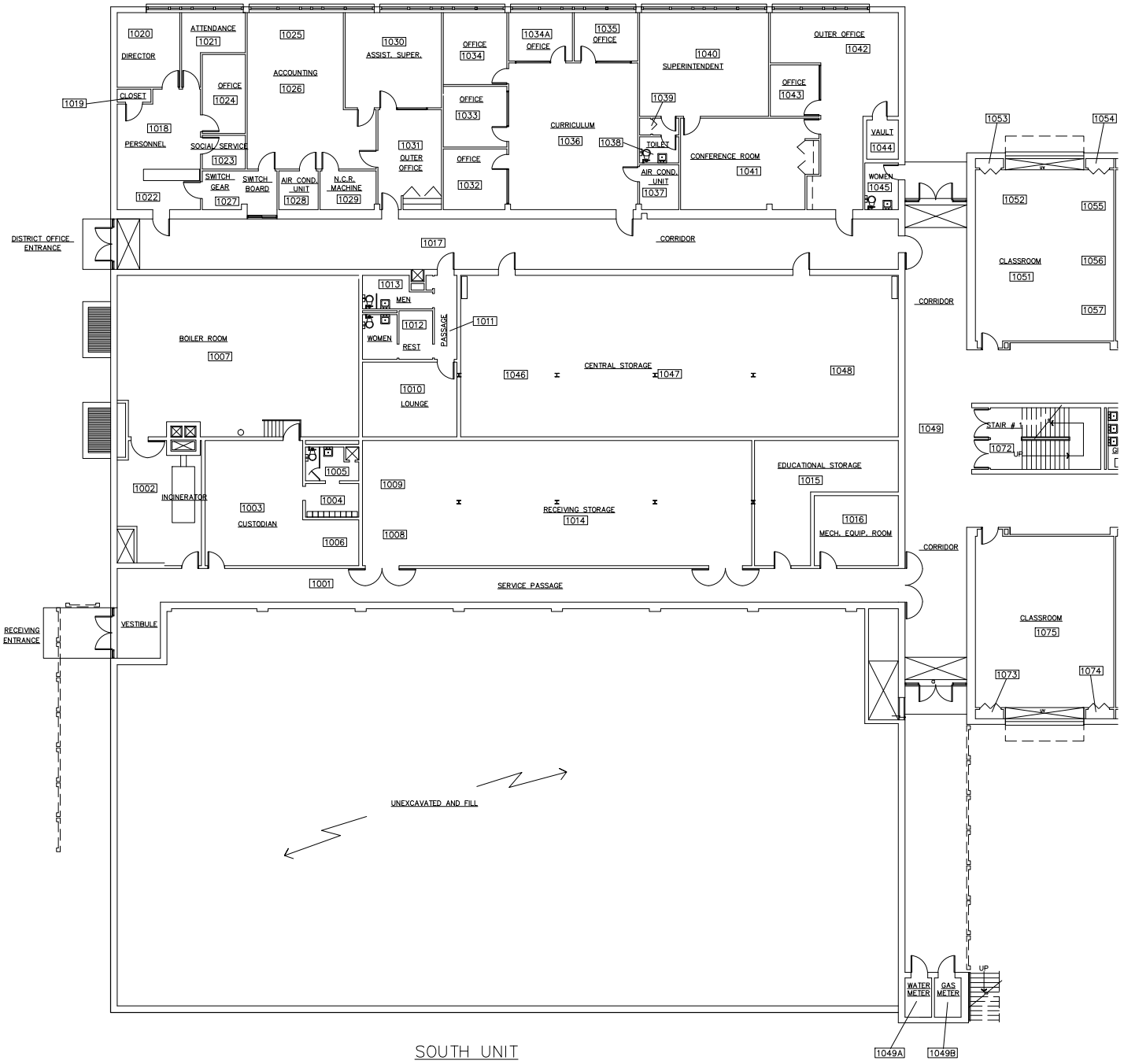
Space No.	Location	Material Description	HA/USA	Quantity	Amount Damaged	Hazard Rank	AHERA Reassessment Category	Response Action	Remarks
2129	223	9" x 9" Floor tile	FT	900 SF	0	7	N/A Non Friable	O&M	Good condition
2130	222 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
2131	222 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
2132	222	9" x 9" Floor tile	FT	900 SF	0	7	N/A Non Friable	O&M	Good condition
2133	221 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
2134	221 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
2135	221	9" x 9" Floor tile	FT	900 SF	0	7	N/A Non Friable	O&M	Good condition
2140	218	9" x 9" Floor tile	FT	250 SF	0	7	N/A Non Friable	O&M	Good condition
2141	219	9" x 9" Floor tile	FT	450 SF	0	7	N/A Non Friable	O&M	Good condition
2142	cafeteria #2	9" x 9" Floor tile	FT	2600 SF	0	7	N/A Non Friable	O&M	Good condition
2146	kitchen toilet vestibule	9" x 9" Floor tile	FT	40 SF	0	7	N/A Non Friable	O&M	Good condition
2150	cafeteria #1 & hallway	9" x 9" Floor tile	FT	3200 SF	1 SF	4	N/A Non Friable	Repair	damaged tiles. one tile missing.
3002	301 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
3003	301 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
3004	301	9" x 9" Floor tile	FT	925 SF	0	7	N/A Non Friable	O&M	Good condition
3005	302 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
3006	302 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
3007	302	9" x 9" Floor tile	FT	925 SF	0	7	N/A Non Friable	O&M	Good condition
3008	303 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
3009	303 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
3010	303	9" x 9" Floor tile	FT	850 SF	0	7	N/A Non Friable	O&M	Good condition
3011	304 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
3012	304 closet - R	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition
3013	304	9" x 9" Floor tile	FT	850 SF	0	7	N/A Non Friable	O&M	Good condition
3021	321 closet - L	9" x 9" Floor tile	FT	10 SF	0	7	N/A Non Friable	O&M	Good condition

Space No.	Location	Material Description	HA/USA	Quantity	Amount Damaged	Hazard Rank	AHERA Reassessment Category	Response Action	Remarks
3022	321 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3023	321	9" x 9" Floor tile	ft	875 sf	0	7	N/A Non Friable	O&M	Good condition
3024	320 closet - l	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition. One tile missing.
3025	320 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3026	320	9" x 9" Floor tile	ft	875 sf	0	7	N/A Non Friable	O&M	Good condition
3027	319 closet - l	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3028	319 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3029	319	9" x 9" Floor tile	ft	875 sf	0	7	N/A Non Friable	O&M	Good condition
3030	318 closet - l	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3032	318 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3034	318	9" x 9" Floor tile	ft	875 sf	0	7	N/A Non Friable	O&M	Good condition
3036	306	9" x 9" Floor tile	ft	1100 sf	0	7	N/A Non Friable	O&M	Good condition
3037	307	9" x 9" Floor tile	ft	1100 sf	0	7	N/A Non Friable	O&M	Good condition
3038	307.1	9" x 9" Floor tile	ft	400 sf	0	7	N/A Non Friable	O&M	Good condition. four tiles missing in room 306 office.
3044	308 closet - l	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3045	308 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3046	308	9" x 9" Floor tile	ft	875 sf	0	7	N/A Non Friable	O&M	Good condition
3047	309 closet - l	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3048	309 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3049	309	9" x 9" Floor tile	ft	875 sf	0	7	N/A Non Friable	O&M	Good condition
3050	310 closet - l	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3051	310 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3052	310	9" x 9" Floor tile	ft	875 sf	0	7	N/A Non Friable	O&M	Good condition
3061	313 closet - l	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition

Space No.	Location	Material Description	HA/USA	Quantity	Amount Damaged	Hazard Rank	AHERA Reassessment Category	Response Action	Remarks
3062	313 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3063	313	9" x 9" Floor tile	ft	900 sf	0	7	N/A Non Friable	O&M	Good condition
3064	312 closet - l	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3065	312 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3066	312	9" x 9" Floor tile	ft	900 sf	1 sf	4	N/A Non Friable	Repair	damaged tiles
3067	311 closet - l	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3068	311 closet - r	9" x 9" Floor tile	ft	10 sf	0	7	N/A Non Friable	O&M	Good condition
3069	311	9" x 9" Floor tile	ft	900 sf	0	7	N/A Non Friable	O&M	Good condition

Appendix C

DRAWINGS



SOUTH UNIT

ENVIROSCIENCE CONSULTANTS
2150 SMITHTOWN AVENUE
RONKONKOMA, NY 11779
(631) 580-3191
FAX 580-3195
www.envirohealth.org

KEY PLAN

NO SCALE

PROJECT

SIX MONTH AHERA SURVEILLANCE
PORT CHESTER MIDDLE SCHOOL

CLIENT

PORT CHESTER PUBLIC SCHOOLS
113 BOWMAN AVENUE
RYE BROOK, NY 10573

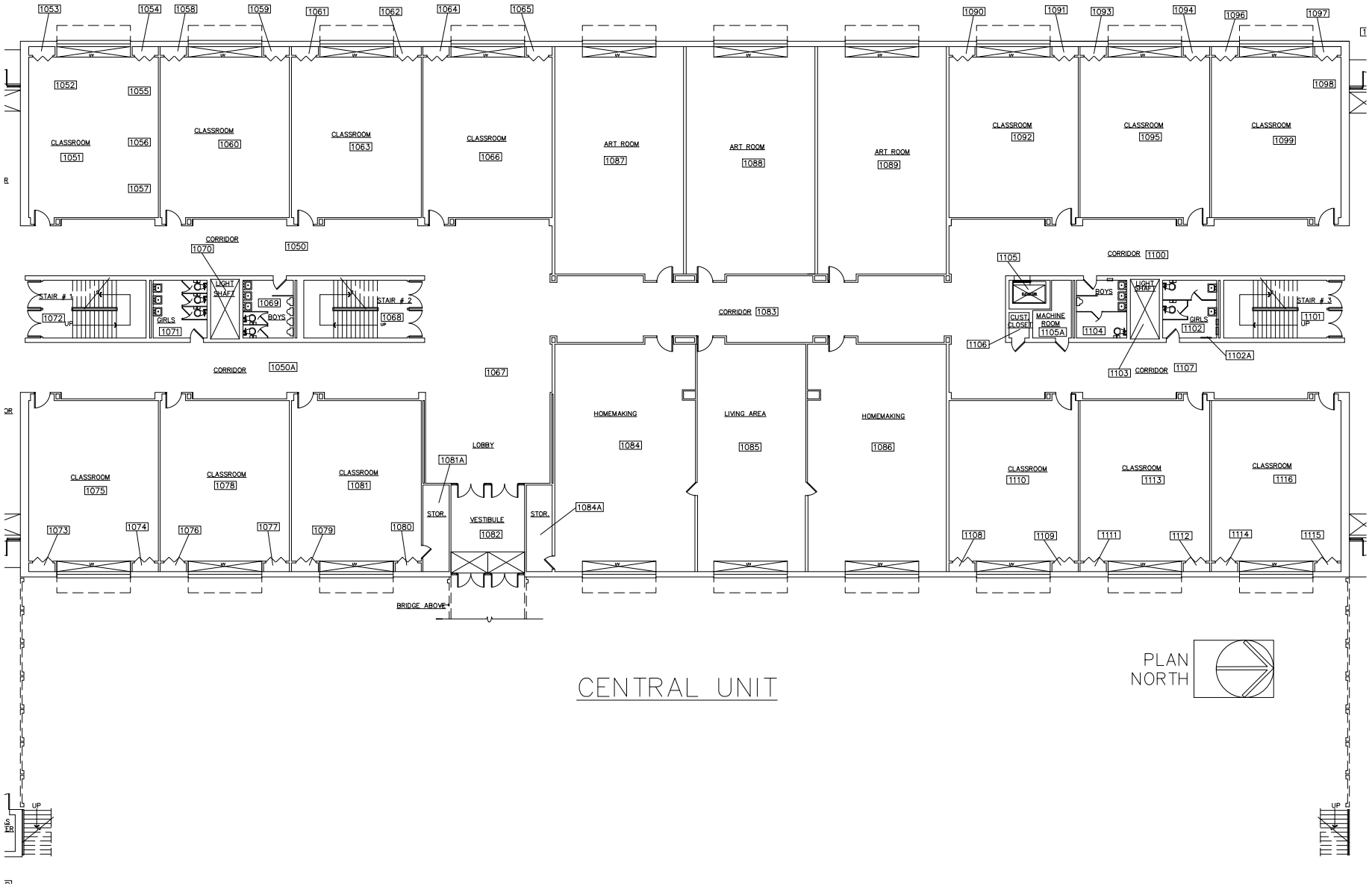
PROJECT #: 23111

COMMENTS: PARTIAL BASEMENT

NOT TO SCALE

Date: **01/2023**

By: **Drew Cheskin**



ENVIROSCIENCE CONSULTANTS
2150 SMITHTOWN AVENUE
RONKONKOMA, NY 11779
(631) 580-3191
FAX 580-3195
www.envirohealth.org

KEY PLAN

NO SCALE

PROJECT

SIX MONTH AHERA SURVEILLANCE
PORT CHESTER MIDDLE SCHOOL

CLIENT

PORT CHESTER PUBLIC SCHOOLS
113 BOWMAN AVENUE
RYE BROOK, NY 10573

PROJECT #: 23111

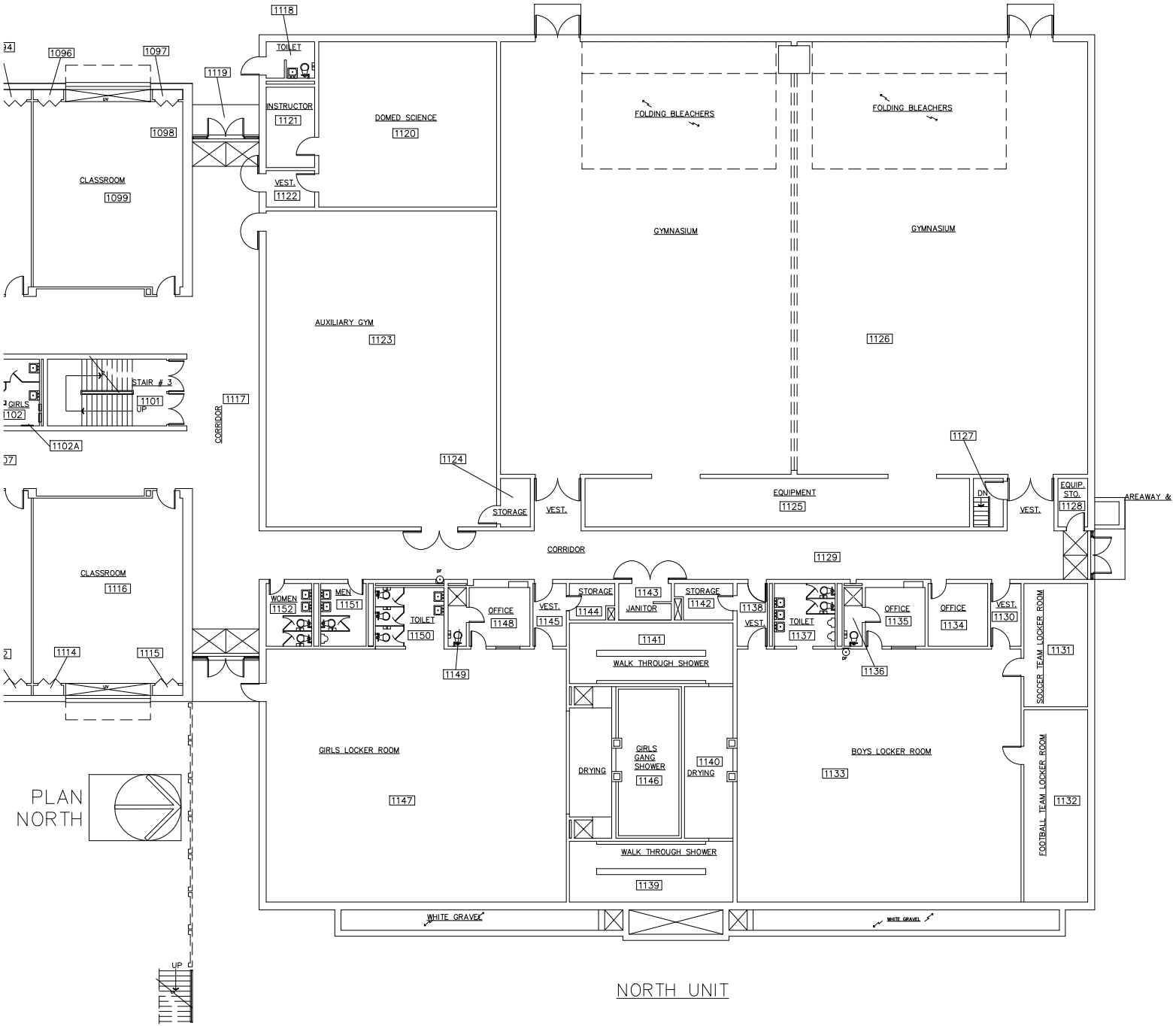
COMMENTS: PARTIAL BASEMENT

NOT TO SCALE

Date: **01/2023**

By: **Drew Cheskin**

DRAWING 2 of 7



ENVIROSCIENCE CONSULTANTS
2150 SMITHTOWN AVENUE
RONKONKOMA, NY 11779
(631) 580-3191
FAX 580-3195
www.envirohealth.org

KEY PLAN

NO SCALE

PROJECT

SIX MONTH AHERA SURVEILLANCE
PORT CHESTER MIDDLE SCHOOL

CLIENT

PORT CHESTER PUBLIC SCHOOLS
113 BOWMAN AVENUE
RYE BROOK, NY 10573

PROJECT #: 23111

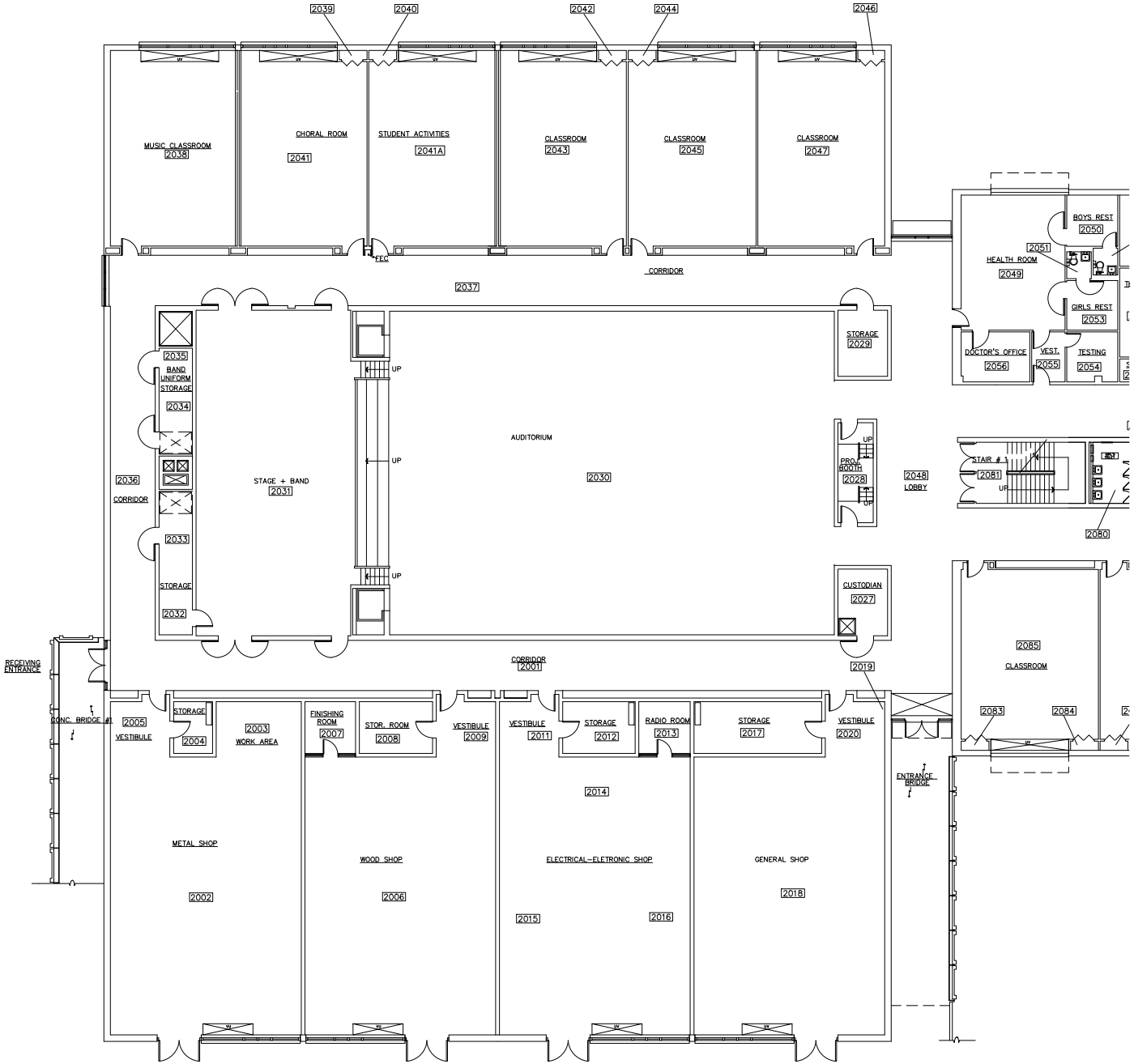
COMMENTS: PARTIAL BASEMENT

NOT TO SCALE

Date: **01/2023**

By: **Drew Cheskin**

DRAWING 3 of 7



SOUTH UNIT– MAIN FLOOR PLAN

ENVIROSCIENCE CONSULTANTS
2150 SMITHTOWN AVENUE
RONKONKOMA, NY 11779
(631) 580-3191
FAX 580-3195
www.envirohealth.org

KEY PLAN

NO SCALE

PROJECT

SIX MONTH AHERA SURVEILLANCE
PORT CHESTER MIDDLE SCHOOL

CLIENT

PORT CHESTER PUBLIC SCHOOLS
113 BOWMAN AVENUE
RYE BROOK, NY 10573

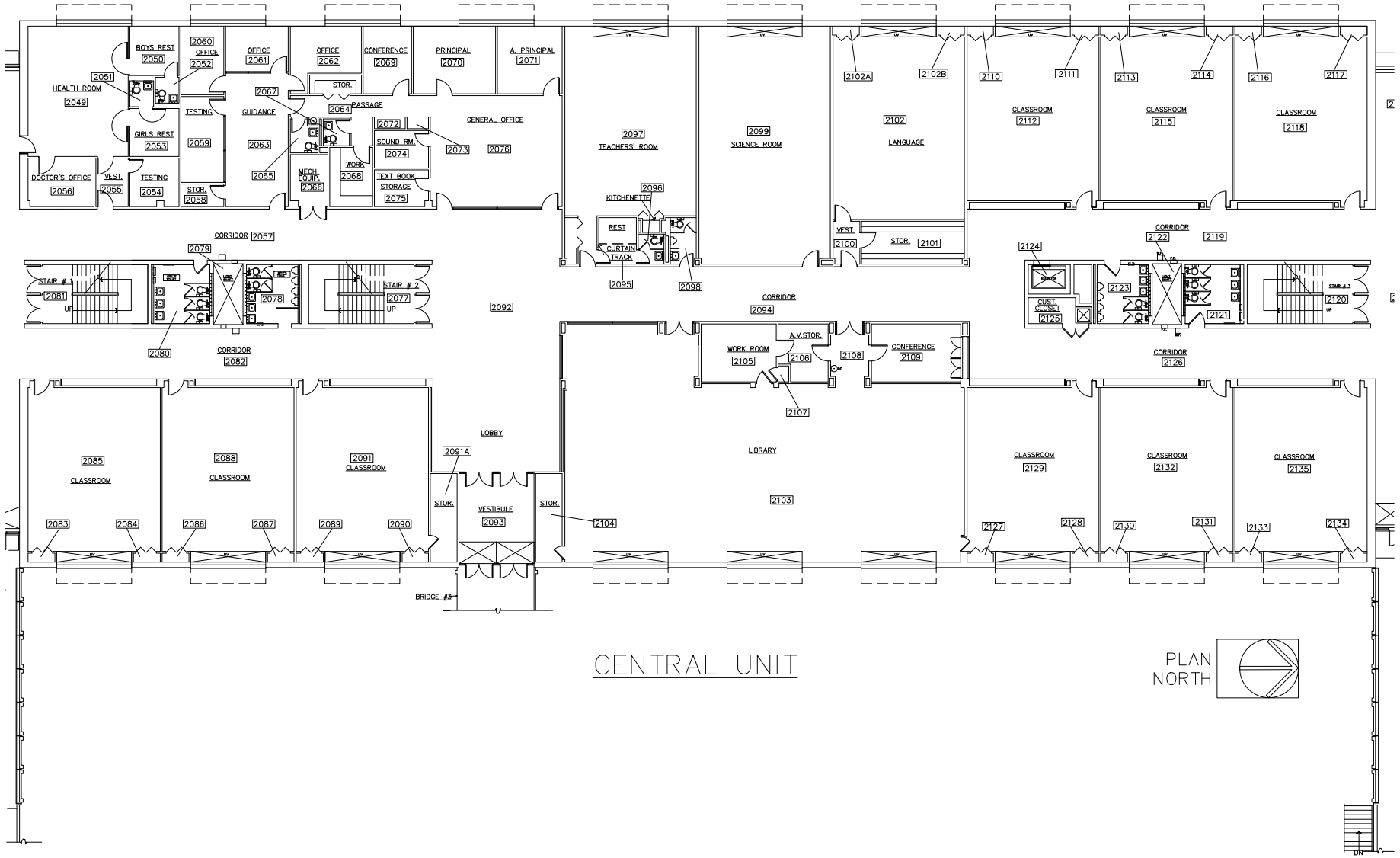
PROJECT #: 23111

COMMENTS: PARTIAL FIRST FLOOR

NOT TO SCALE

Date: **01/2023**

By: **Drew Cheskin**



CENTRAL UNIT

PLAN NORTH

ENVIROSCIENCE CONSULTANTS
2150 SMITHTOWN AVENUE
RONKONKOMA, NY 11779
(631) 580-3191
FAX 580-3195
www.envirohealth.org

KEY PLAN

NO SCALE

PROJECT

SIX MONTH AHERA SURVEILLANCE
PORT CHESTER MIDDLE SCHOOL

CLIENT

PORT CHESTER PUBLIC SCHOOLS
113 BOWMAN AVENUE
RYE BROOK, NY 10573

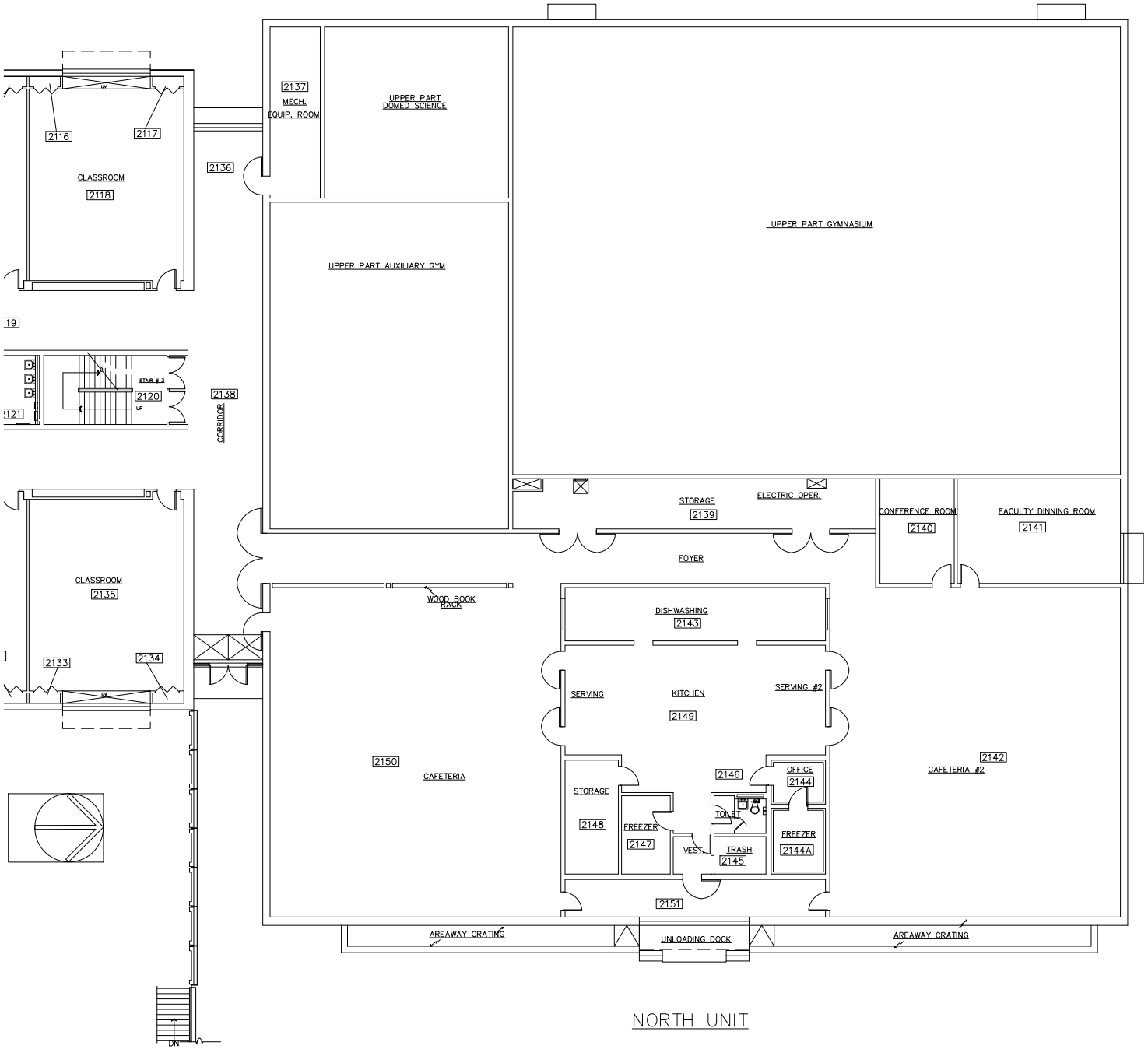
PROJECT #: 23111

COMMENTS: PARTIAL FIRST FLOOR

NOT TO SCALE

Date: **01/2023**

By: **Drew Cheskin**



NORTH UNIT

ENVIROSCIENCE CONSULTANTS
2150 SMITHTOWN AVENUE
RONKONKOMA, NY 11779
(631) 580-3191
FAX 580-3195
www.envirohealth.org

KEY PLAN

NO SCALE

PROJECT

SIX MONTH AHERA SURVEILLANCE
PORT CHESTER MIDDLE SCHOOL

CLIENT

PORT CHESTER PUBLIC SCHOOLS
113 BOWMAN AVENUE
RYE BROOK, NY 10573

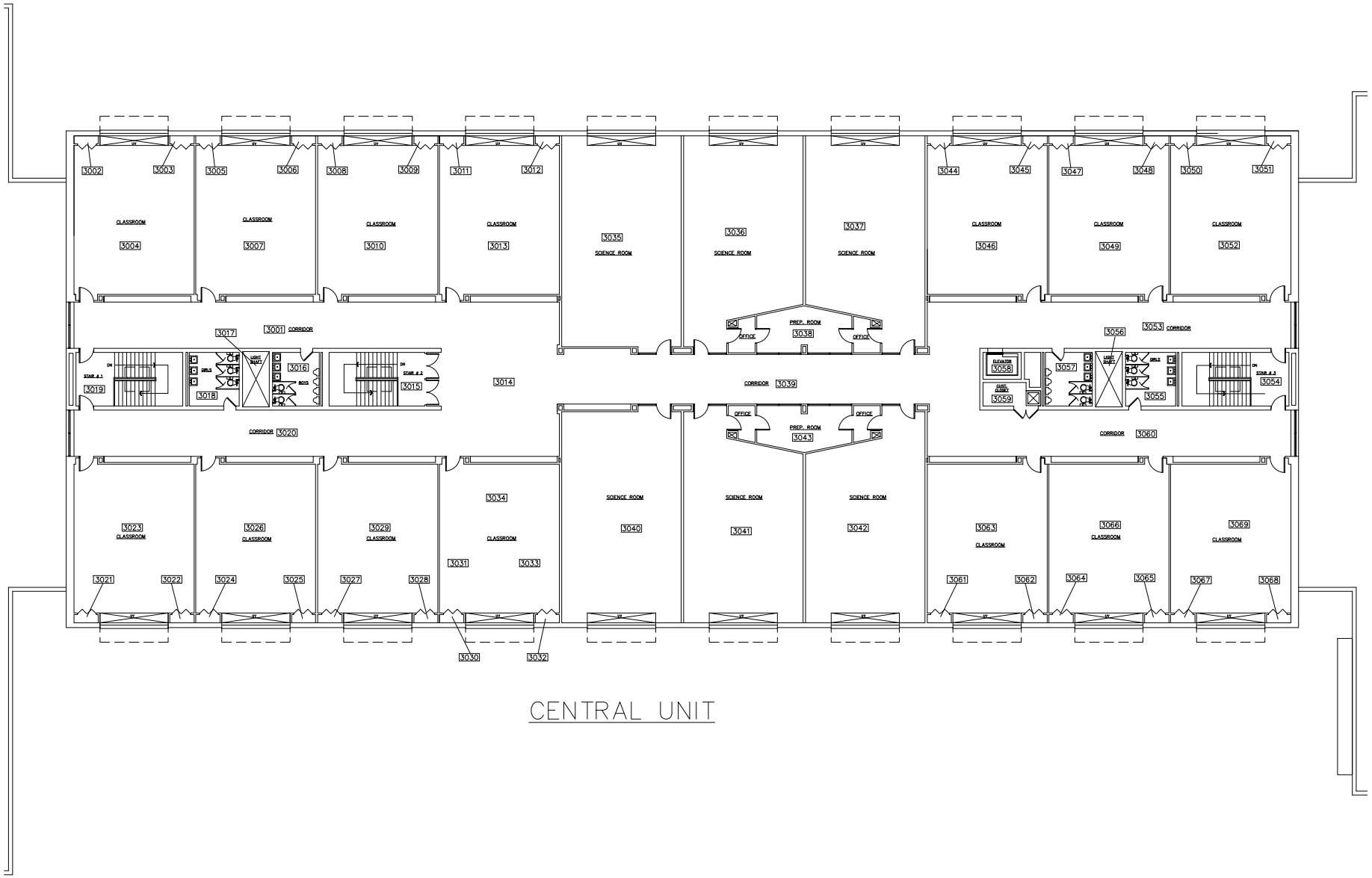
PROJECT #: 23111

COMMENTS: PARTIAL FIRST FLOOR

NOT TO SCALE

Date: **01/2023**

By: **Drew Cheskin**



CENTRAL UNIT

ENVIROSCIENCE CONSULTANTS
2150 SMITHTOWN AVENUE
RONKONKOMA, NY 11779
(631) 580-3191
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KEY PLAN

NO SCALE

PROJECT

SIX MONTH AHERA SURVEILLANCE
PORT CHESTER MIDDLE SCHOOL

CLIENT

PORT CHESTER PUBLIC SCHOOLS
113 BOWMAN AVENUE
RYE BROOK, NY 10573

PROJECT #: 23111

COMMENTS: SECOND FLOOR

NOT TO SCALE

Date: **01/2023**

By: **Drew Cheskin**

DRAWING 7 of 7

Appendix D

CERTIFICATIONS

ENVIROSCIENCE CONSULTANTS
A Mainline Company

WE ARE YOUR DOL

NEW YORK STATE | Department of Labor

DIVISION OF SAFETY & HEALTH LICENSE AND CERTIFICATE UNIT, STATE OFFICE CAMPUS, BLDG. 12, ALBANY, NY 12226

ASBESTOS HANDLING LICENSE

Enviroscience Consultants, LLC
2150 Smithtown Avenue, Ronkonkoma, NY, 11779

License Number: 28733
License Class: RESTRICTED
Date of Issue: 11/04/2022
Expiration Date: 11/30/2023
Duly Authorized Representative: Bartley Gallagher

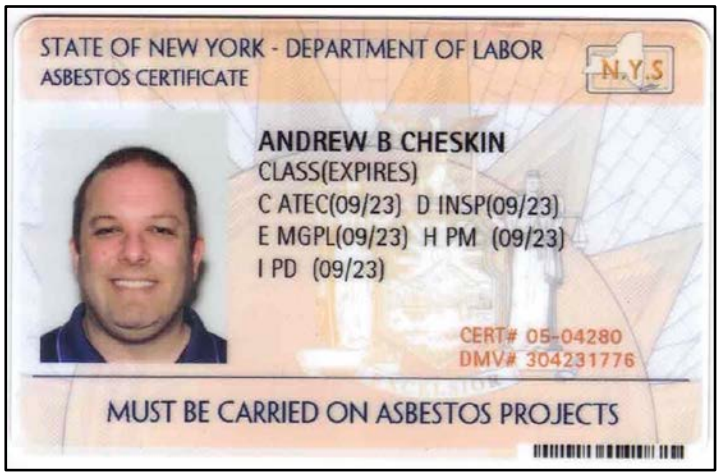
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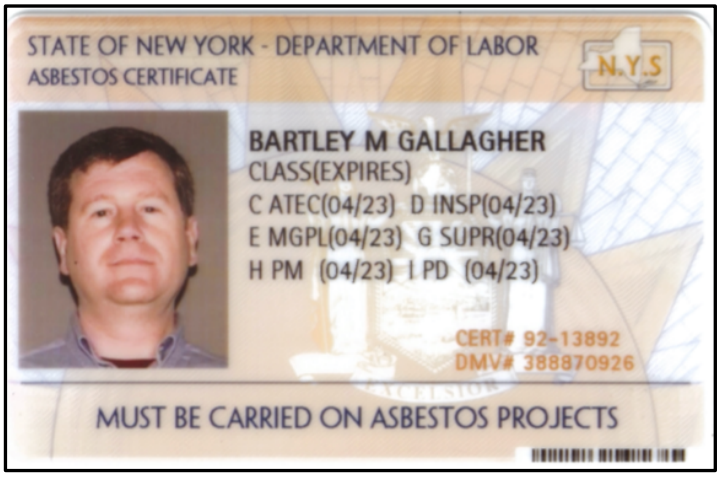
This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

Amy Phillips, Director
For the Commissioner of Labor

EXCELSIOR

SH 432 (12/21)


STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE
N.Y.S
ANDREW B CHESKIN
CLASS(EXPIRES)
C ATEC(09/23) D INSP(09/23)
E MGPL(09/23) H PM (09/23)
I PD (09/23)
CERT# 05-04280
DMV# 304231776
MUST BE CARRIED ON ASBESTOS PROJECTS


STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE
N.Y.S
BARTLEY M GALLAGHER
CLASS(EXPIRES)
C ATEC(04/23) D INSP(04/23)
E MGPL(04/23) G SUPR(04/23)
H PM (04/23) I PD (04/23)
CERT# 92-13892
DMV# 388870926
MUST BE CARRIED ON ASBESTOS PROJECTS