



architects + engineers

PROJECT MANUAL

**HASTINGS-ON-HUDSON UNION FREE SCHOOL
DISTRICT**

27 FARRAGUT AVE

HASTINGS-ON-HUDSON, NY 10706

**AUDITORIUM RENOVATIONS TO
FARRAGUT MIDDLE SCHOOL**

SED CONTROL NO. 66-04-04-03-0-001-036

Contract G - General Construction, Abatement, and Plumbing
Work

Contract M - Heating, Ventilation and Air Conditioning Work

Contract E - Electrical Work

Project No.: **HHSD1905**

FINAL BID MANUAL

DATE: 08/05/2021

H2M architects + engineers
2700 Westchester Ave, Suite 415
Purchase, N.Y. 10577

The design of this project conforms to all applicable provision of the New York State Uniform Fire Prevention and Building Code, the New York State Energy Conservation Code, and the building standards of the New York State Education Department.

Notice is hereby given that **SEALED PROPOSALS** for:

Hastings-On-Hudson Union Free School District
Auditorium Renovations to Farragut Middle School

SED: 66-04-04-03-0-001-036

CONTRACT G - GENERAL CONSTRUCTION, ABATEMENT, AND PLUMBING WORK

CONTRACT M - HEATING, VENTILATION, AND AIR CONDITIONING WORK

CONTRACT E - ELECTRICAL WORK

will be received until **2:00 PM on September 3rd at Farragut High School's main entrance security desk located at 1 Mt. Hope Blvd., Hastings-on-Hudson, NY 10706**. In the event that on this date the Hastings-On-Hudson Union Free School District is closed to all students and all staff or has an early dismissal due to weather or any other emergency that closes all schools and offices for all students and all staff prior to 2:00 pm, bids will be due at 2:00 pm on the next day that the school district is open.

Complete sets of Hard Copy Bidding Documents, Drawings and Specifications, may be obtained beginning **Thursday, August 5th**, from REVplans, 330 Route 17A, Suite #2, Goshen, New York 10924 Tel: 1-877-272-0216, upon depositing the sum of **One Hundred Dollars (\$100.00)** for each combined set of documents. Checks or money orders shall be made payable to Hastings-On-Hudson Union Free School District. Plan deposit is refundable in accordance with the terms in the Instructions to Bidders to all submitting bids. Any bidder requiring documents to be shipped shall make arrangements with the printer and pay for all packaging and shipping costs.

As a convenience to the Contractor digital Bidding Documents, Drawings and Specifications may be obtained from the following website: www.revplans.com as an online download for **Forty-Nine Dollars (\$49.00)**, in form of credit card.

Please note REVplans and www.revplans.com are the designated locations and means for distributing and obtaining all bid package information. All bidders are urged to register to ensure receipt of all necessary information, including bid addenda.

All bid addenda will be transmitted to registered plan holders via email and will be available at www.revplans.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 REVplans 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 specifications 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, Hastings-On-Hudson Union Free School District"**, clearly marked on the outside, **"Auditorium Renovations to Farragut Middle School, SED NO. 66-04-04-03-0-001-036. 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 by employees of the Hastings-On-Hudson Union Free School District, as well as of improper hand delivery.

Each proposal submitted must be accompanied by a certified check or bid bond, made payable to the "Hastings-On-Hudson Union Free School District", in an amount equal to ten percent (10%) 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 his/her bid price for ninety (45) days after the formal bid opening.

A pre-bid meeting and walk thru is scheduled for 11:30 AM on Wednesday, August 18th at the Farragut Middle School and High School, 27 Farragut Avenue, Hastings-on-Hudson, NY 10706. Potential bidders are asked to gather at the main entrance to the building. Although the pre-bid meeting and walk-thru are **not** mandatory, it is highly recommended that all potential bidders attend. . **Bidders are asked to wear face masks during the pre-bid walk thru as they are required by the District for entry asked to wear face masks during the pre-bid walk thru as they are required by the District for entry regardless of vaccination status.**

It is the Board's intention to award the contract to the lowest qualified bidder in compliance with the specifications providing the required security who can meet the experience, technical and budget requirements. The Board reserves the right to reject any or all bids, waive any informality and to accept such bid which, in the opinion of the Board, is in the best interests of the School District.

By Order of the Board of Education

Hastings-On-Hudson Union Free School District

27 Farragut Ave

Hastings-on-Hudson, NY 10706

BIDS FOR PROJECT

The Board of Education of the Hastings-On-Hudson Union Free School District (hereafter called School District), will receive **SEALED PROPOSALS** for:

**Hastings-On-Hudson Union Free School District
Auditorium Renovations to Farragut Middle School**

SED: 66-04-04-03-0-001-036

CONTRACT G - GENERAL CONSTRUCTION, ABATEMENT WORK, AND PLUMBING WORK

CONTRACT M - HEATING, VENTILATION, AIR CONDITIONING WORK

CONTRACT E - ELECTRICAL WORK

TIME AND PLACE

The sealed proposals are to be submitted at the:

**Hastings-On-Hudson Union Free School District
Board of Education
27 Farragut Ave
Hastings-on-Hudson, NY 10706**

See notice to bidders for all dates and times.

REQUIRED BID SUBMISSIONS

Each bid submission shall consist of three (3) sealed envelopes containing the following items. The bidder shall carefully remove all forms from the project specification. The project manual 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, bidders 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 10% of the base bid.
2. Certified letter from Bonding Company, indicating that they 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. Proposal forms (P-sheets).
 - b. Non-collusive form.
 - c. Hold Harmless Agreement.
 - d. Certification of Compliance with the Iran Divestment Act or Declaration of Bidder's Inability to provide Certification of Compliance with the Iran Divestment Act.
 - e. Insurance Certification
 - f. 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 bib must be accompanied by the Insurance Certification Form located in the specifications Failure to provide may result in the Owner finding the bidder "non-responsive" to the bid documents.

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 a certified financial statement.
4. Fully completed statement of bidder's qualification.

5. Fully completed list of subcontractors.

Envelope No. 3 SUB-CONTRACTOR BID QUALIFICATIONS:

CONTRACTORS G shall submit with it's bid, a third and separate sealed envelope containing the list of names of the subcontractors that the bidder will use to perform work and the agreed upon amounts to be paid for each of the following as applicable to the project:

After the low bid is announced, the sealed list of subcontractors submitted by the apparent low bidder shall be opened and the names of the subcontractors announced.

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. The School District may make any investigation it deems necessary to assure itself of the ability of the Bidder to perform the work.
3. The School District reserves the right to reject any or all proposals and to accept the proposal it deems in the best interest of the School District.
4. A tie-bid is defined as an instance where bids are received from two or more Bidders who are the low responsive Bidders, and their offers are identical. It is the policy of the District to settle the outcome of tie-bids by either drawing a name from a hat or flipping a coin within 24 hours of the bid opening. All affected firms will be notified of the tie, the time and place of the resolution of the tie and shall be invited to witness the outcome. Attendance is not mandatory. The drawing/flip will be held at the District Administration Office. Two impartial witnesses will be provided and shall be present. All attendees will acknowledge the results of the tie-breaker on the bid tabulation sheet. All firms affected by the bids will be notified of the results. The results pursuant to this provision shall be considered final.

DEPOSITS

Bidders deposit 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, drawings or the specifications prior to the awarding of the contract.

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

Joesph Ciserano, AIA
Project Architect
H2M Architects + Engineers
2700 Westchester Ave, Suite 415
Purchase, NY 10577
Phone: 631.756.8000 ext. 1337
Fax: 631.694.4122
E-mail: jciserano@h2m.com

To be given consideration, questions must be received in writing at least ten (10) days prior to the date fixed for the opening of bids.

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:

Joesph Ciserano, AIA
Project Architect
H2M Architects + Engineers
2700 Westchester Ave, Suite 415
Purchase, NY 10577
Phone: 631.756.8000 ext. 1337
Fax: 631.694.4122
E-mail: jciserano@h2m.com

To be given consideration, questions must be received in writing at least ten (10) days prior to the date fixed for the opening of bids. Any and all interpretations and any supplement instructions will be in the form of written addenda to the specifications, and will be sent by mail or faxed to each of the Contractors who has taken out the Drawings and Contract Documents.

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. The bidder shall acquaint himself/herself with all apparent conditions and characteristics of the facility with regard to assessment of required materials quantities, evaluation of quality of existing materials, access to the site and equipment's, 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 the Proposal, 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 CONFERENCE

See Section "Notice to Bidders"

BIDDER TO BE FAMILIAR WITH PLANS AND REQUIREMENTS

It is the bidder's responsibility to examine carefully the plans and specifications, proposal and the site upon which the work is to be performed. A proposal submitted shall be prima facie evidence that the bidder has made such examination and that he/she is familiar with all of the conditions and requirements.

PREPARATION OF PROPOSAL

The Proposal forms for 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.

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 therein, 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 ten percent (10 %) of the total amount of the project bid, and payable to the "Hastings-On-Hudson 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 contract. Provide a certified statement that the bonding company meets or exceeds the requirements set forth in Article 11 of the General Conditions.

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 him, his employees, or his work hereunder in his 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, he/she shall promptly notify the Architect in writing and any necessary changes shall be adjusted as provided in the contract for changes in the work. 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, he/she bear all costs arising there-from.

CONTRACTOR'S UNDERSTANDING

It is understood and agreed that the Contractor has, by careful examination, satisfied himself/herself 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 this contract.

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 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 his 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 or 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(W) 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(X) 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. The Owner may request an extension in writing, if necessary, for bidders to hold their bid for an additional 45 days.

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.

Triton Construction Co., Inc.

Attn: Kevin Sawyer

30 East Street, 11th Floor

New York, NY 10016

Phone: (212) 388-5700

Email: k-sawyer@tritonconstruction.net

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. Fully execute AIA-A305 Contractors Qualification Statement.
- b. Most recent financial statement by CPA.
- c. 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 identified in this contract. Additionally, include the names of two 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, sent within forty five (45) days after the bids have been opened.

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 is required to be carried by the successful bidder and its contractors, are listed as 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 two (2) years after its acceptance.

Each Contractor shall provide for the continuation of the Performance Bond as a Maintenance Bond for two (2) full years after date of final payment request at the full contract price.

The work is to be performed and completed to the satisfaction of the School District & 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, as amended by Chapter 750 of the Laws of 1956, provides (among other things) that it shall be the duty of the fiscal officer to make a determination of the schedule of wages to be paid to all laborers, workers and mechanics employed on public work projects, including supplements for welfare, pension, vacation and other benefits. These supplements include hospital, surgical or medical insurance, or benefits; life insurance or death benefits; accidental death or dismemberment insurance; and pension or retirement benefits. If the 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, as amended by Chapter 750 of the Laws of 1956, also provides that the supplements to be provided to laborers, workers and mechanics upon public work, "...shall be in accordance with the prevailing practices in the locality..." The amount for supplements listed on the enclosed schedule does not necessarily include all types of prevailing supplements in the locality, and a future determination of the Industrial Commissioner may require the Contractor to provide additional supplements.

The original payrolls or transcripts shall be preserved for three (3) years from the completion of the work on the awarded project by the Contracts. The School District shall receive such payroll record upon completion of project.

**Hastings-On-Hudson Union Free School District
Board of Education
27 Farragut Ave**

Hastings-on-Hudson, NY 10706

QUALIFICATIONS OF BIDDERS

Experience and Qualifications of the Bidder: 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:

- 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 from each of the 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
 - (iii) 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 a 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.

STATEMENT OF BIDDER'S QUALIFICATIONS

1. Name of Bidder

2. Type of Business Party

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 the bidder's business.

6a. Have any of the persons listed in Number 5 owned/operated/been shareholders in any other companies? If so, please state name of owned/operated/been shareholders and names of other companies:

6b. If the answer to number 6a is in the affirmative, list said persons and the names of their previous affiliations.

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

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

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

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

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

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

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 during the five years preceding the submission of this bid? If the answer to this question is yes, list the name of the individual convicted or indicted, the charge against the individual and the date of disposition of the charge.

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

16. Has the bidder bid on any projects for the period September 1, 2018 to present? If the answer to this question is yes, list the projects bid on, whether said bid was awarded to the bidder and the expected date of commencement 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.

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.

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

19. 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 for which the surety provided supervisory services.

Dated:

By: _____
(Signature)

(Print Name and Title)

Sworn to before me this

____ day of _____, 20____

Notary Public

Contract G - General Construction and Abatement Work

Contract M - Heating, Ventilation and Air Conditioning Construction

Contract E - Electrical Construction

Contract P - Plumbing Construction

To: **Hastings-On-Hudson Union Free School District**
 27 Farragut Ave
 Hastings-on-Hudson, NY 10706

For the furnishing and installing of materials for all work included under contract as follows:

Made this _____ day of _____, 2021

Bidders Declaration:

The party named as Bidder declares that the only person or persons interested in this bid or proposal as principal or principals is or 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 and 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 it has examined the site of the work, the contract and specifications and the drawings referred to; and has read the Information for Bidders hereto attached; and it proposes and agrees, if this proposal is accepted, it will contract in the form as approved to perform all the work mentioned in said contract and specifications; and it will accept in full payment therefor the following sums to wit:

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.

BASE BID: Contract G – General Construction and Abatement Work

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 2 – ASBESTOS REMOVAL

(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 - SPECIALITIES

(written in words) _____ (\$)

ITEM 14 – DIVISION 11 - EQUIPMENT

(written in words) _____ (\$)

ITEM 15 – DIVISION 12 - FURNISHINGS

(written in words) _____ (\$)

ITEM 16 – DIVISION 14 – CONVEYING EQUIPMENT

(written in words) _____ (\$)

ITEM 17 – DIVISION 22 – PLUMBING

(written in words) _____ (\$)

ITEM 18 – PROJECT CLOSEOUT

(written in words) _____ (\$)

ALLOWANCE GA-1 – ALLOWANCE FOR GENERAL CONTINGENCY

(written in words) _____ Forty- Thousand Dollars _____ (\$40,000.00)

TOTAL BASE BID (ITEMS 1 – 18 INCLUSIVE, PLUS ALLOWANCE GA-1)

(written in words) _____ (\$)

Note: The HASTINGS-ON-HUDSON UNION FREE SCHOOL DISTRICT is exempt from Federal, New York State and local taxes. TOTAL AMOUNT BID shall be exclusive of all taxes.

EACH BIDDER SHALL SUBMIT WITH IT'S BID A SEPARATE SEALED LIST THAT NAMES THE SUBCONTRACTORS THAT THE BIDDER WILL USE TO PERFORM WORK AND THE AGREED UPON AMOUNT TO BE PAID FOR A.) HEATING, VENTILATION AND AIR-CONDITIONING WORK, B.) PLUMBING WORK AND C.) ELECTRICAL WORK. AFTER THE LOW BID IS ANNOUNCED, THE SEALED LIST OF SUBCONTRACTORS SUBMITTED BY THE APPARENT LOW BIDDER SHALL BE OPENED AND THE NAMES OF THE SUBCONTRACTORS ANNOUNCED. ANY CHANGE OF SUBCONTRACTOR OR AGREED UPON AMOUNT TO BE PAID SHALL REQUIRE THE APPROVAL OF THE PUBLIC OWNER, UPON A SHOWING OF "LEGITIMATE CONSTRUCTION NEED" FOR SUCH CHANGE.

"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.

THE SEALED LISTS OF SUBCONTRACTORS SUBMITTED BY ALL OTHER BIDDERS SHALL BE RETURNED TO THEM UNOPENED AFTER THE CONTRACT AWARD.

PAYMENTS TO SUBCONTRACTORS AND MATERIAL MEN MUST BE MADE WITHIN 7 CALENDAR DAYS AS OPPOSED TO 15 CALENDAR DAYS OF THE RECEIPT OF PAYMENT FROM THE PUBLIC OWNER. FAILURE TO PAY WITHIN 7 CALENDAR DAYS WILL RESULT IN INTEREST 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 SCHEDULED CLOSING TIME FOR RECEIVING BIDS.

THE BIDDER HAS SUBMITTED ALL REQUESTS FOR OTHER BRAND NAMES OR PRODUCTS NOT LISTED IN THE SPECIFICATIONS IN ACCORDANCE WITH ARTICLE 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.

NUMBER	DESCRIPTION	COST
ALT. G1 (Add)	Provide Labor, Equipment and Material costs for General and Plumbing Construction work to add the Accessible Toilet Room to the Auditorium Lobby.	(\$)
ALT. G2 (Add) (Deduct)	Provide Add/Deduct Alternate for Second Shift (3:30 - 11:00pm) work for the entire project. All work to be performed after school hours	(\$)
ALT. G3 (Add)	Provide costs required to coordinate work with the Electrical Contractor responsible for providing all Labor, Equipment and Material costs for the installation of the Production Lighting System.	(\$)
ALT. G4 (Add) (Deduct)	Provide costs required to coordinate work with the Electrical Contractor responsible for providing all Labor, Equipment and Material costs for the installation of the Audio/Visual System.	(\$)

TOTAL BID (ITEMS 1–18 INCLUSIVE, PLUS ALLOWANCE GA-1, AND ALTERNATES G1, G2, G3 and G4)

(written in words) _____ (\$ _____)

UNIT PRICES

THE CONTRACT SHALL INCLUDE UNIT PRICES AS HEREIN STATED. SHOULD THE AMOUNT OF WORK REQUIRED BY THE CONTRACT DOCUMENTS BE INCREASED OR DECREASED, THE FOLLOWING UNIT PRICES SHALL BE USED AS A BASIS FOR COMPUTING THE COST TO THE DISTRICT, OR THE CREDIT DUE THE DISTRICT AS THE CASE MAY BE, FOR SUCH INCREASES OR DECREASES IN THE WORK. THE LISTED UNIT PRICES WILL ALSO BE USED FOR DETERMINING THE VALUE OF QUANTITIES INCLUDED IN THE SPECIFICATIONS. PRICES SHALL REFLECT THE BASIS FOR FURNISHING ALL LABOR, MATERIAL, EQUIPMENT AND OTHER RELATED ITEMS NECESSARY FOR COMPLETION OF WORK (IN PLACE). THE QUOTED FIGURE SHALL INCLUDE CONTRACTOR'S OVERHEAD AND PROFIT.

THE OWNER/ARCHITECT HEREBY RESERVES THE RIGHT TO ORDER ANY ADDITION OR DEDUCTION OF MATERIALS ON BASIS OF UNIT COST FIGURES QUOTED.

NUMBER	DESCRIPTION	COST
U-1	Remove 1" plaster ceiling over metal lathe over metal framing. Provide new metal lathe and 1" plaster ceiling to provide seamless transition to surrounding area. Prime and paint area to match existing.	\$ _____sf
U-2	Remove 1" plaster finish wall over existing CMU. Provide new 1" plaster finish wall to provide seamless transition to surrounding area. Prime and paint area to match existing.	\$ _____sf
U-3	Sand, seal and refinish existing Hardwood Flooring with matching stain and urethane coating to match color and sheen of existing flooring.	\$ _____sf
U-4	Remove and replace existing Hardwood Flooring with matching materials to align flush with the existing flooring in a pattern to match existing. Install over Rosin paper utilizing concealed stainless fasteners per manufacturers recommendation. Finish with stain and urethane coating required to match color and sheen of existing flooring.	\$ _____sf
U-5	Prepare, fill, sand, prime and apply two finish coats of type and finish sheen or gloss in color selected by the District. Include all protections for adjacent materials.	\$ _____sf

SITE SUPERVISION

THE SUCCESSFUL CONTRACTOR IS TO PROVIDE FULL TIME SITE SUPERVISION FOR HIS OR HER 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 HIS OR HER 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

ALL WORK UNDER THIS CONTRACT SHALL BE COMPLETED BETWEEN THE FOLLOWING HOURS, IN ACCORDANCE WITH THE FOLLOWING DATES:

WORK DAYS:	Monday – Saturday
WORK HOURS:	7:00 AM – 8:00 PM
CONSTRUCTION START DATE:	September 14, 2021
SUBSTANTIAL COMPLETION:	February 15, 2022
FINAL COMPLETION:	March 1, 2022

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 WORK BY THE SPECIFIED TIME SHALL SUBJECT HIM/HER TO LIQUIDATED DAMAGES AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS.

THE ARCHITECT/ENGINEER SHALL ACT AS THE RECORD KEEPER OF CONTRACT DAYS; HE WILL BE THE SOLE JUDGE OF DELAYS CAUSED BY WEATHER. ONLY WEATHER DELAYS, AS ADJUDGED BY THE ARCHITECT/ENGINEER, WILL BE CONSIDERED FOR EXTENSIONS OF THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL SUBMIT A BI-WEEKLY REQUEST FOR DELAYS DUE TO WEATHER TO THE ARCHITECT/ENGINEER FOR APPROVAL. NO OTHER DELAY CLAIMS WILL BE ACCEPTED, FOR CREDIT TOWARDS THE PROJECT COMPLETION SCHEDULE, REGARDLESS OF THE SOURCE OF THE DELAY.

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 NOTICE TO PROCEED.

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 INSURANCES.

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

THE UNDERSIGNED HEREBY ACKNOWLEDGES RECEIPT OF THE FOLLOWING ADDENDA (IF ANY):

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.

SUCH DEDUCTION SHALL BE IN ACCORDANCE WITH THE ARCHITECT, ENGINEER'S, AND/OR OTHER CONSTRUCTION EMPLOYEE(S) STANDARD HOURLY BILLING RATES IN EFFECT AT THE TIME FOR THE SCHOOL DISTRICT.

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:

DAY: () _____ NIGHT: () _____

FAX: () _____

FEDERAL I.D. NO. OR SOCIAL SECURITY NO.: _____

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.

BASE BID: Contract M – Heating, Ventilation, Air Conditioning Work

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 23 – HVAC PIPING (INCLUDING MATERIALS, INSULATION, PIPE HANGERS AND SUPPORTS, IDENTIFICATION, AND LABOR)

(written in words) _____ (\$)

ITEM 5 – DIVISION 23 – AIR HANDLING SYSTEMS (INCLUDING PACKAGED ROOFTOP UNITS, EXHAUST FANS, DUCTWORK, INSULATION, AND IDENTIFICATION)

(written in words) _____ (\$)

ITEM 6 – PROJECT CLOSEOUT

(written in words) _____ (\$)

ALLOWANCE HA-1 – ALLOWANCE FOR GENERAL CONTINGENCY

(written in words) _____ Twenty Thousand (\$20,000)

TOTAL BASE BID (ITEMS 1 – 6 INCLUSIVE, PLUS ALLOWANCE HA-1)

(written in words) _____ (\$)

Note: The HASTINGS-ON-HUDSON UNION FREE SCHOOL DISTRICT is exempt from Federal, New York State and local taxes. TOTAL AMOUNT BID shall be exclusive of all taxes.

EACH BIDDER SHALL SUBMIT WITH IT'S BID A SEPARATE SEALED LIST THAT NAMES THE SUBCONTRACTORS THAT THE BIDDER WILL USE TO PERFORM WORK AND THE AGREED UPON AMOUNT TO BE PAID FOR A.) HEATING, VENTILATION AND AIR-CONDITIONING WORK, B.) PLUMBING WORK AND C.) ELECTRICAL WORK. AFTER THE LOW BID IS ANNOUNCED, THE SEALED LIST OF SUBCONTRACTORS SUBMITTED BY THE APPARENT LOW BIDDER SHALL BE OPENED AND THE NAMES OF THE SUBCONTRACTORS ANNOUNCED. ANY CHANGE OF

SUBCONTRACTOR OR AGREED UPON AMOUNT TO BE PAID SHALL REQUIRE THE APPROVAL OF THE PUBLIC OWNER, UPON A SHOWING OF "LEGITIMATE CONSTRUCTION NEED" FOR SUCH CHANGE.

"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.

THE SEALED LISTS OF SUBCONTRACTORS SUBMITTED BY ALL OTHER BIDDERS SHALL BE RETURNED TO THEM UNOPENED AFTER THE CONTRACT AWARD.

PAYMENTS TO SUBCONTRACTORS AND MATERIAL MEN MUST BE MADE WITHIN 7 CALENDAR DAYS AS OPPOSED TO 15 CALENDAR DAYS OF THE RECEIPT OF PAYMENT FROM THE PUBLIC OWNER. FAILURE TO PAY WITHIN 7 CALENDAR DAYS WILL RESULT IN INTEREST 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 SCHEDULED CLOSING TIME FOR RECEIVING BIDS.

THE BIDDER HAS SUBMITTED ALL REQUESTS FOR OTHER BRAND NAMES OR PRODUCTS NOT LISTED IN THE SPECIFICATIONS IN ACCORDANCE WITH ARTICLE 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.

NUMBER	DESCRIPTION	COST
ALT-H1 (Add)	Provide Labor, Equipment and Materials costs for Heating, Ventilating and Air Conditioning work for the addition of the Accessible Toilet Room to the Auditorium Lobby	(\$)

ALT-H2 (Add)	Provide Add/Deduct Alternate for Second Shift (3:30 - 11:00pm) work for the entire project. All work to be performed after school hours	(\$)
-------------------------	--	------------------------------------

TOTAL BID (ITEMS 1–6 INCLUSIVE, PLUS ALLOWANCE HA-1, AND ALTERNATES H1 and H2)

(written in words) _____ (\$)

SITE SUPERVISION

THE SUCCESSFUL CONTRACTOR IS TO PROVIDE FULL TIME SITE SUPERVISION FOR HIS OR HER 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 HIS OR HER 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

ALL WORK UNDER THIS CONTRACT SHALL BE COMPLETED BETWEEN THE FOLLOWING HOURS, IN ACCORDANCE WITH THE FOLLOWING DATES:

WORK DAYS:	Monday – Saturday
WORK HOURS:	7:00 AM - 8:00 PM
CONSTRUCTION START DATE:	September 14, 2021
SUBSTANTIAL COMPLETION:	February 15, 2022
FINAL COMPLETION:	March 1, 2022

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 WORK BY THE SPECIFIED TIME SHALL SUBJECT HIM/HER TO LIQUIDATED DAMAGES AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS.

THE ARCHITECT/ENGINEER SHALL ACT AS THE RECORD KEEPER OF CONTRACT DAYS; HE WILL BE THE SOLE JUDGE OF DELAYS CAUSED BY WEATHER. ONLY WEATHER DELAYS, AS ADJUDGED BY THE ARCHITECT/ENGINEER, WILL BE CONSIDERED FOR EXTENSIONS OF THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL SUBMIT A BI-WEEKLY REQUEST FOR DELAYS DUE TO WEATHER TO THE ARCHITECT/ENGINEER FOR APPROVAL. NO OTHER DELAY CLAIMS WILL BE ACCEPTED, FOR CREDIT TOWARDS THE PROJECT COMPLETION SCHEDULE, REGARDLESS OF THE SOURCE OF THE DELAY.

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 NOTICE TO PROCEED.

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 INSURANCES.

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

THE UNDERSIGNED HEREBY ACKNOWLEDGES RECEIPT OF THE FOLLOWING ADDENDA (IF ANY):

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.

SUCH DEDUCTION SHALL BE IN ACCORDANCE WITH THE ARCHITECT, ENGINEER'S, AND/OR OTHER CONSTRUCTION EMPLOYEE(S) STANDARD HOURLY BILLING RATES IN EFFECT AT THE TIME FOR THE SCHOOL DISTRICT.

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:

DAY: () _____ NIGHT: () _____

FAX: () _____

FEDERAL I.D. NO. OR SOCIAL SECURITY NO.: _____

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.

BASE BID: Contract E– Electrical Work
--

ITEM 1 – BONDS and INSURANCES

(written in words) _____ (\$)

ITEM 2 – DIVISION 1 – GENERAL REQUIREMENTS

(written in words) _____ (\$)

ITEM 3 – DIVISION 7 – PENETRATION FIRESTOPPING

(written in words) _____ (\$)

ITEM 4 – DIVISION 26 – ELECTRICAL DEMOLITION

(written in words) _____ (\$)

ITEM 5 – DIVISION 26 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

(written in words) _____ (\$)

ITEM 6 – DIVISION 26 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

(written in words) _____ (\$)

ITEM 7 – DIVISION 26 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

(written in words) _____ (\$)

ITEM 8 – DIVISION 26 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

(written in words) _____ (\$)

ITEM 9 – DIVISION 26 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

(written in words) _____ (\$)

ITEM 10 – DIVISION 26 – PANELBOARDS

(written in words) _____ (\$)

ITEM 11 – DIVISION 26 – ENCLOSED SWITCHES AND COMBINATION MOTOR CONTROLLERS

(written in words) _____ (\$)

ITEM 12 – DIVISION 26 - LIGHTING

(written in words) _____ (\$)

ITEM 13 – PROJECT CLOSEOUT

(written in words) _____ (\$ _____)

ALLOWANCE EA-1 – ALLOWANCE FOR GENERAL CONTINGENCY

(written in words) _____ Fifteen Thousand _____ (\$15,000.00)

TOTAL BASE BID (ITEMS 1 – 13 INCLUSIVE, PLUS ALLOWANCE EA-1)

(written in words) _____ (\$ _____)

Note: The HASTINGS-ON-HUDSON UNION FREE SCHOOL DISTRICT is exempt from Federal, New York State and local taxes. TOTAL AMOUNT BID shall be exclusive of all taxes.

EACH BIDDER SHALL SUBMIT WITH IT'S BID A SEPARATE SEALED LIST THAT NAMES THE SUBCONTRACTORS THAT THE BIDDER WILL USE TO PERFORM WORK AND THE AGREED UPON AMOUNT TO BE PAID FOR A.) HEATING, VENTILATION AND AIR-CONDITIONING WORK, B.) PLUMBING WORK AND C.) ELECTRICAL WORK. AFTER THE LOW BID IS ANNOUNCED, THE SEALED LIST OF SUBCONTRACTORS SUBMITTED BY THE APPARENT LOW BIDDER SHALL BE OPENED AND THE NAMES OF THE SUBCONTRACTORS ANNOUNCED. ANY CHANGE OF SUBCONTRACTOR OR AGREED UPON AMOUNT TO BE PAID SHALL REQUIRE THE APPROVAL OF THE PUBLIC OWNER, UPON A SHOWING OF "LEGITIMATE CONSTRUCTION NEED" FOR SUCH CHANGE.

"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.

THE SEALED LISTS OF SUBCONTRACTORS SUBMITTED BY ALL OTHER BIDDERS SHALL BE RETURNED TO THEM UNOPENED AFTER THE CONTRACT AWARD.

PAYMENTS TO SUBCONTRACTORS AND MATERIAL MEN MUST BE MADE WITHIN 7 CALENDAR DAYS AS OPPOSED TO 15 CALENDAR DAYS OF THE RECEIPT OF PAYMENT FROM THE PUBLIC OWNER. FAILURE TO PAY WITHIN 7 CALENDAR DAYS WILL RESULT IN INTEREST 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 SCHEDULED CLOSING TIME FOR RECEIVING BIDS.

THE BIDDER HAS SUBMITTED ALL REQUESTS FOR OTHER BRAND NAMES OR PRODUCTS NOT LISTED IN THE SPECIFICATIONS IN ACCORDANCE WITH ARTICLE 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.

NUMBER	DESCRIPTION	COST
ALT-E1 (Add)	Provide Labor, Equipment and Material costs for Electrical Construction work to add the Accessible Toilet Room to the Auditorium Lobby.	(\$)
ALT-E2 (Add) (Deduct)	Provide Add/Deduct Alternate for Second Shift (3:30 - 11:00pm) work for the entire project. All work to be performed after school hours	(\$)
ALT-E3 (Add)	Provide Labor, Equipment and Material costs for the installation of the Production Lighting System.	(\$)
ALT-E4 (Add)	Provide Labor, Equipment and Material costs for the installation of the Audio/Visual System.	(\$)

TOTAL BID (ITEMS 1–13 INCLUSIVE, PLUS ALLOWANCE EA-1, AND ALTERNATES E1, E2, E3 and E4)

(written in words) _____ (\$)

SITE SUPERVISION

THE SUCCESSFUL CONTRACTOR IS TO PROVIDE FULL TIME SITE SUPERVISION FOR HIS OR HER 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 HIS OR HER 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

ALL WORK UNDER THIS CONTRACT SHALL BE COMPLETED BETWEEN THE FOLLOWING HOURS, IN ACCORDANCE WITH THE FOLLOWING DATES:

WORK DAYS:	Monday – Saturday
WORK HOURS:	7:00 AM - 8:00 PM
CONSTRUCTION START DATE:	September 14, 2021
SUBSTANTIAL COMPLETION:	February 15, 2022
FINAL COMPLETION:	March 1, 2022

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 WORK BY THE SPECIFIED TIME SHALL SUBJECT HIM/HER TO LIQUIDATED DAMAGES AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS.

THE ARCHITECT/ENGINEER SHALL ACT AS THE RECORD KEEPER OF CONTRACT DAYS; HE WILL BE THE SOLE JUDGE OF DELAYS CAUSED BY WEATHER. ONLY WEATHER DELAYS, AS ADJUDGED BY THE ARCHITECT/ENGINEER, WILL BE CONSIDERED FOR EXTENSIONS OF THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL SUBMIT A BI-WEEKLY REQUEST FOR DELAYS DUE TO WEATHER TO THE ARCHITECT/ENGINEER FOR APPROVAL. NO OTHER DELAY CLAIMS WILL BE ACCEPTED, FOR CREDIT TOWARDS THE PROJECT COMPLETION SCHEDULE, REGARDLESS OF THE SOURCE OF THE DELAY.

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 NOTICE TO PROCEED.

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 INSURANCES.

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

THE UNDERSIGNED HEREBY ACKNOWLEDGES RECEIPT OF THE FOLLOWING ADDENDA (IF ANY):

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.

SUCH DEDUCTION SHALL BE IN ACCORDANCE WITH THE ARCHITECT, ENGINEER'S, AND/OR OTHER CONSTRUCTION EMPLOYEE(S) STANDARD HOURLY BILLING RATES IN EFFECT AT THE TIME FOR THE SCHOOL DISTRICT.

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:

DAY: () _____ NIGHT: () _____

FAX: () _____

FEDERAL I.D. NO. OR SOCIAL SECURITY NO.: _____

Enclosed in the bid package is a certified check or bid bond for ten percent (10%) of the total amount of each of the school project bid as required by the foregoing "Information for Bidders."

On the signing of such contract by the Bidder, the bidder hereby agrees to furnish the indemnifying bonds as provided in the General Conditions.

The Bidder hereby further agrees that in the event of its failure or refusal to enter into a contract in accordance with this bid within ten (10) business days after due notice from the Board of Education that the contract has been awarded to it and is ready for signature, as given in accordance with the Information for Bidders and/or its failure to execute and deliver the bond for the full amount of the contract price, as provided in said Information for Bidders, the Bidder's check or bid bond which is herewith deposited with the Board shall (at the option of said Board) become due and payable as ascertained and liquidated damages for such default; otherwise, said check or bid bond will be returned to the undersigned.

The full names and residences of all persons and parties interested in the foregoing bid as principals are as follows:

Name	Address
_____	_____
_____	_____
_____	_____

Name of Bidder: _____

Business Address of Bidder: _____

END OF SECTION

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 for must accompany your bid submission for your bid to be considered.

Insurance Representative's Acknowledgement:

We have reviewed the insurance requirements set forth 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 received the insurance requirements of this bid and have considered the costs, if any, of procuring the required insurance and will be able to supply the insurance required in accordance with the bid, if it is awarded. I understand that this Insurance Certification form must be submitted with my bid and my inability to provide the required insurances may result in the rejection of my bid, and the Hastings-on-Hudson 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 he 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 by Chapter 675 of the Laws of 1966, and Section 139-D of the State Finance Law, as amended by Chapter 675 of the Laws of 1966, and Section 2604 of the Public Authorities Law, as amended by Chapter 675 of the Laws of 1966.

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:

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

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

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

3. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit 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 with 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 his/her 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 one (a).

- (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 in his/her behalf."

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

Title: _____

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

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 foregoing requirements for insurance shall not relieve the Contractor from liability set forth under the Indemnity 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 this agreement by the contractor, whether such claims shall be made by an employee of the contractor or by a third party, the contractor covenants and agrees that he / she will pay all costs and expenses arising therefrom and in connection therewith, and if any judgment shall be rendered against the Owner, Architect/Engineer & Construction manager, in any such litigation, the Contractor shall at his / her own expense satisfy and discharge the same.

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) will be developing a list of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law) (the "Prohibited Entities List"). Pursuant to SFL § 165-a(3)(b), the initial list is expected to be issued no later than 120 days after the Act's effective date at which time it will be posted on the OGS website.

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

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

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

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

_____ of the _____ Corporation and that neither

the Bidder/ Contractor nor any proposed subcontractor is identified on the Prohibited Entities List.

(SIGNED)

SWORN to before me this

_____ day of _____

20____

Notary Public: _____

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

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

Name of the Bidder: _____

Address of Bidder: _____

Has bidder been involved in investment activities in Iran? _____

Describe the type of activities including but not limited to the amounts and the nature of the investments (e.g. banking, energy, real estate) _____

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

Have the investment activities ended? _____

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

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

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

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

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

I, _____ being duly sworn, deposes and says that he/she is the _____ of
the _____ Corporation and the foregoing is true and accurate.

SWORN to before me this

SIGNED

_____ day of _____

20__

Notary Public: _____

**THIS FORM MUST BE COMPLETED BY BIDDER AND INCLUDED IN SEPARATE SEALED
ENVELOPE MARKED "SUB CONTRACTORS LIST"**

(I)
Subcontractor Name:
Type of Work:
Agreed upon amount to be paid subcontractor:

(II)
Subcontractor Name:
Type of Work:
Agreed upon amount to be paid subcontractor:

(III)
Subcontractor Name:
Type of Work:
Agreed upon amount to be paid subcontractor:

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 8NYCRR155.5, 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 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 fore 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 exiting, 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 contaminants 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.

AGREEMENT made as of the day of in the year of Two Thousand and Twenty-One.

BETWEEN the Owner
(Name and address)

Hastings-on-Hudson Union Free School District
27 Farragut Avenue
Hastings-on-Hudson, New York 10706

and the Contractor:
(Name and address)

TBD

The Project is:
(Name and location)

Renovations at Farragut Middle School and High School
27 Farragut Avenue
Hastings-on-Hudson, NY 10706

The Architect is:
(Name and address)

H2M architects + engineers
2700 Westchester Avenue
Suite 415
Purchase, NY 10577

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, other documents listed in Article 9 of this Agreement and Modifications issued after execution of this Agreement; these 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.

ARTICLE 2
THE WORK OF THIS CONTRACT

The Contractor shall execute the entire Work 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 work and substantial completion of the work of this contract shall be in accordance with the schedule set forth in the Project Manual.

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 or 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 (written contract amount), subject to additions and deductions as provided in the Contract Documents.

4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Bid Proposal Form (attached hereto) and are hereby accepted by the Owner:

- G-1 – New Toilet Room at Auditorium Lobby
- G-2 – Second Shift Work
- G-3 – Coordination Work for Production Lighting Systems
- G-4 – Coordination Work for Audio/Visual Systems

4.3 Unit prices are as set forth in the proposal sheets.

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, or as follows:

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 final completion of the work of this contract. 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 and materialmen with whom the Contractor has subcontracted, the amount of such subcontract, the amount requested for any subcontractor or materialman 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 materialmen's liens from all subcontractors, materialmen 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, materialmen and, where appropriate, from lower tier subcontractors, covering all amounts described in this Paragraph 5.2;
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 and employees of subcontractors performing work on the Project.
2. Copies of invoices submitted to the Contractor by its subcontractors and/or material suppliers.

ARTICLE 6
FINAL PAYMENT

Final payment, constituting the entire unpaid balance of the Contract Sum, 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; such 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 follows 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 Contract Documents; and
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.

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 Paragraph 7.2, 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

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

8.2 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 and attached hereto.

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

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

9.1.5 The Addenda, if any, are as follows:

This Agreement is entered into as of the day and year first written above and is executed in at least three 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

Hasting-on-Hudson U.F.S.D.
27 Farragut Avenue
Hastings-on-Hudson, NY 10707

By _____
(Signature)

By _____
(Signature)

(Printed name and title)

(Printed name and title)

GENERAL CONDITIONS
of the
CONTRACT for CONSTRUCTION

TABLE OF CONTENTS

ARTICLE 1 - DEFINITIONS	1
ARTICLE 2 – CONTRACTOR’S REPRESENTATIONS.....	3
ARTICLE 3 – CONTRACTOR’S CONSTRUCTION PROCEDURES	5
ARTICLE 4 – CONTRACTOR’S USE OF SITE	12
ARTICLE 5 – SUBCONTRACTORS	20
ARTICLE 6 – CONTRACTOR’S USE OF DRAWINGS/SPECIFICATIONS.....	22
ARTICLE 7 – CONTRACTOR’S SAFETY/SECURITY PROGRAM.....	33
ARTICLE 8 – CHANGES IN THE WORK.....	39
ARTICLE 9 – PAYMENTS.....	42
ARTICLE 10 – INSURANCE REQUIREMENTS.....	50
ARTICLE 11 – REQUIRED BONDS FOR THE PROJECT.....	53
ARTICLE 12 – INDEMNIFICATION	54
ARTICLE 13 – TIME FOR COMPLETION OF WORK.....	56
ARTICLE 14 – DEFICIENT AND INCOMPLETE WORK.....	59
ARTICLE 15 – FINAL COMPLETION AND CLOSEOUT OF THE PROJECT.....	61
ARTICLE 16 – RELEVANT STATUTORY PROVISIONS	63
ARTICLE 17 – TERMINATION OR SUSPENSION	67
ARTICLE 18 – CLAIMS AND DISPUTES.....	71
ARTICLE 19 – MISCELLANEOUS PROVISIONS	72

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. The document is incorporated by reference into all contracts to be awarded and should be reviewed carefully by the Contractor to whom the award of contract is made. Consultation with an attorney and insurance representative is advised.

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. "After Hours" refers to the time before or after the hours school is in session. During this time, students and staff may occupy portions of the facility or building, but may be redirected as required to allow for the completion of work by a contractor.
- C. 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.
- D. "Board of Education" refers to the Board of Education of the School District.
- E. "Central Administration" refers to the Superintendent of Schools, his/her Assistant Superintendents, and Director of Plant & Facilities.
- F. The "Construction Manager" is the entity engaged by the School District to act as its representative during the course of construction of the Project.
- G. "Contract Documents" refers to all drawings, sketches, specifications, addenda, field directives and all other written or drawn descriptions of the products, labor and materials to be provided for the Project.
- H. The "Contractor" refers to the entity engaged by the School District to perform all or a part of the capital improvement project on its behalf.
- I. 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.

J. The "Off Hours" refers to a period of time during which the school facility or building shall be unoccupied, to be a duration of no less than 24 hours.

K. The "Owner" refers to the Board of Education or its designee.

L. 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.

M. The "Project Manual" is the bound document which is issued simultaneously with the project Drawings and includes the Notice to Bidders, Information to Bidders, Bid Proposal Form, 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.

N. A "Subcontractor" is a person or entity who has a direct contract with the 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 the 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.

O. The term "Specialist" or "Specialty Contractor" as used in these specifications 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.

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 the 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 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, 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. “Unusual” refers to means and methods beyond any conventional or generally accepted standard of work or installation, generally requiring a standard of care and protection as outlined by a manufacturer’s guidelines and recommendations.

W. 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 and surrounding areas; (b) the cost of labor, materials and equipment necessary to perform the work, the availability; (c) the areas of the work which will cause a disruption to the necessary and proper operation of the facilities by the Owner; and (d) 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.

3. Each trade contractor certifies to be 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, the requirement of normal "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 and 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 trade 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 its agreement with the Owner. 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 Agreement, the Contractor represents the following:

1. The drawings and accompanying specifications found in the project manual issued simultaneously with said drawings 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 and 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 and Specifications for the Contract have been prepared with

care and are intended to show 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 his instructions and the Contract 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.

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 nor 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 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 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 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 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. 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 his/her assistant(s) and/or project manager shall be confirmed in writing by the 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 or the Architect shall have the right to have any supervisory or management staff removed from the project with or without cause.

I. Each Contractor shall provide, or otherwise see that, the project manager, or on site superintendent site managers, and/or responsible workers of each Contractor and major subcontractor are equipped with cellular phones and radios. Each Contractor shall provide the Owner and the Architect with the number for each phone and worker.

J. The Contractor's supervisory personnel, including superintendents 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

to facilitate communications with such supervisory personnel, superintendents and/or assistants.

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 for the Prime Contractor employed by the Prime 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 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 Construction Manager, 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 drawings and/or specifications except as set forth in subparagraph 3 hereof.

2. Tests, inspections and approval of portions of the Contractor's work required by laws, ordinances, rules, regulations or orders of public authorities or governmental agency having jurisdiction shall 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 ordinances, laws, codes, rules and/or regulations 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 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 for the performance of work upon the site or of work which may be necessary to be performed for the proper execution of the work to be performed hereunder, 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. The Contractor agrees to defend and indemnify Owner, Architect, Construction Manager, Consultants and Sub-consultants, from all claims made against any of them arising out of Contractor's acts or omissions **or** the acts or omissions of any subcontractor of the Contractor which have caused damage to the Owner, Architect, Construction Manager or other contractor(s) on the project. The Owner's right to indemnification hereunder shall in no way be diminished, waived or discharged, or by the exercise of any other remedy provided for by the contract or by law. Further, the Owner shall 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 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 Owner's Representative 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 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 laws, ordinances, rules, regulations and lawful orders 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.

2. The Contractor shall pay any costs or fees incurred and any fines or penalties imposed as a result of any violation, including any costs or fees incurred by the Owner due to such violation. If the Contractor observes any discrepancies between portions of the Contract Documents, 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, and rules and regulations without such notice to the Architect 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.

4. If the Contractor fails to give such notices, it shall be liable for and shall indemnify and hold harmless (1) the Owner, its consultants, employees, officers and agents, (2) the Architect and its consultants, employees, officers and agents, and (3) the Construction Manager, 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.

P. The Contractor recognizes and acknowledges that job meetings will be held at the job site weekly unless otherwise designated by the Owner or the Architect. 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. A "Daily Construction" form is included in these specifications and shall be

used for reporting these activities. In addition, the Contractors are to submit a Two Week Look Ahead schedule for upcoming work. A "Two Week Look Ahead" form is included in these specifications for the Contractor's use.

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 videotaped 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 liability 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.

E. 1. 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. 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, etc., 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;
- g. Advising all personnel of hazardous conditions, including supervisors and workers;

Each contractor is responsible for instituting the above policies to insure 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 a construction project shall maintain 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, 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 insufficient space is 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, 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 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 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. No 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 site 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 this contract by said scheduled dates, 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 facility 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 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 designated trailer park area only. 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 agreement between the Contractor and the Owner, 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. Free 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 at which 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 others engaged by the Contractor to perform its work are prohibited from 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 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, or Suppliers.

5. Without limitation of any other provision of the agreement between the Owner and Contractor, 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 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 or use of controlled substances is permitted on the grounds. The Contractor shall insure that none of its or its Subcontractors, its employees, agents, and/or consultants report to the site impaired by alcohol or controlled substances. The Contractor bears the responsibility of determining if its, or its subcontractors, employees 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, 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, representative, agents and consultants, and all of its Subcontractors' employees, representatives, agents and consultants at the site 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 all 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 worked 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 cleanup 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 conditions involved.

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

S. 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.

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 General Contractor shall construct temporary partitions where shown on 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 and the Architect.

2. Where a contractor other than the General Contractor is the only contractor scheduled to perform work in a particular area of the site at any given time, the responsibilities allocated to the General Contractor in subdivision 1 of this paragraph U shall be performed by such other contractor.

3. 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 job site. Such storage shall be in compliance with OSHA regulations.

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

W. The Contractor shall be responsible for all costs incurred by the Owner caused by false security/fire alarms set off by the Contractor. Costs shall include custodial response charges etc.

X. The Contractor shall be responsible for broken glass, 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.

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 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 the contract to the Contractor.

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 this prime contract, and has the necessary experience, personnel, equipment, plant, and financial ability to complete the subcontract in accordance with the intent to the 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 Owner, Construction Manager or Architect, 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 Owner, Construction Manager or Architect shall re-consider its determination and shall advise the Contractor of its determination upon such review. If the Owner, Construction Manager or Architect still finds that such subcontractor does not meet the requirements above-stated, it shall advise the Contractor. The Owner, Construction Manager or 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 terms of the Contractor's agreement with the Owner, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by said agreement, assumes toward the Owner and 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 this Agreement 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 his 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 Agreement between the Owner and Contractor, and all documents incorporated therein by reference, including but not limited to, the drawings and project manual shall be signed by the Contractor and the Owner.

B. 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 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.

C. 1. In the event of inconsistencies within or between parts of the agreement between the Contractor and the Owner or between the agreement between the Contractor and the Owner 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 job 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 addendum (a) are issued and contain changes to the Drawings and/or Specifications, the provisions in the addendum (a) supersede previously issued Drawings and/or Specifications.

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

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

F. 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.

G. 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.

H. 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 and other documents prepared by the Architect, and unless otherwise indicated the Architect shall be deemed the author of them and will retain 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.

I. 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.

J. The Owner shall furnish surveys describing physical characteristics of the site, upon written request of the Contractor and to the extent such survey is in existence at the time of said request, 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.

K. 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.

L. 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.

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

N. 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 bench marks established by the Owner.

O. 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 experience in performing construction surveys similar to the work they will perform for this 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 his own work.

P. 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.

Q. 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.

R. 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.

S. 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.

T. 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 contract 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.

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

V. 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 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 this 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 this project shall be asbestos free.

W. Equivalents. In the Specifications, one or more kinds, types, brands, or manufacturers or 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, and prior to award of contract, what kind, type, brand or manufacturer 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.X below.

X. 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 request in writing that it be permitted to make a substitution for the specified manufacturer or materials and shall indicate 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;
- 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 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.

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 this contract, including professional services necessary and/or required for the architect and engineers to implement said 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. 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 the proposed substitution will have no effect on the construction schedule.

3. Proposals for substitutions shall be submitted in triplicate to the Architect in sufficient time to allow the Architect no less than fourteen (14) working days of award of contract for review.

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

5. All proposed substitutions shall be submitted to the Architect within fourteen (14) working days of the award of the contract to the Contractor. *(This provision 6(X)(5) shall not apply to equivalents.)*

Y. 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 agreement between the Owner and the Contractor. 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 revision 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 as set forth in the Project Manual.

Z. The Architect will interpret and decide matters concerning performance under and requirements of the drawings and/or technical 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 technical 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.

AA. 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 its work.

BB. The Contractor shall maintain at the site, 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 either Owner 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).

CC. 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.

DD. Each Prime Contractor shall be furnished, free of charge, 3 copies of the Contract Documents and Project Manuals, including 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 Safety/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 radius, and lift locations, stockpiles, toilet locations, site water and power locations, and safety. 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. 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 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. Effective July 1, 2008, 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.

The Contractor and its subcontractors shall conduct their operation in accordance with the Safety Guides for Construction as issued by the SED, and, the Contractors' Safety Program.

3. 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 employees, superintendents, and/or other agents, and its subcontractors, 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 or Construction Manager and 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.

4. 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.

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

6. 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 site whose duty shall be the prevention of accidents. The Contractor shall notify the Construction Manager in writing its "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 and order 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.

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 surety 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 and other person 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, whether stored on or off the site and whether in its care, custody and control or that of its Subcontractors, subcontractors to its subcontractors, or material suppliers.

H. The Contractor shall take all steps necessary to protect all property at or adjacent to the site, 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/etc. permitted on the site 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 this cancellation will be the responsibility of the contractor responsible for the work involved.

J. All crane picks, materials delivery, etc. must be coordinated so as not to lift over any occupied area of the building. If absolutely necessary, this work shall be done on off hours to insure the safety of the building occupants. Crane location must approved by the Construction Manager to insure the safety of building occupants.

K. The Owner or Construction Manager reserves the right to have all 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 or Construction Manager will not assume any responsibility for the safe operation of any 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 of its responsibility to provide all engineering, permits and inspections as required by OSHA or the New York State Education Department prior to use of any hoisting equipment.

L. The Construction Manager, the Owner, and/or the Architect will not assume any responsibility for the safe operation of any cranes or equipment by exercising this right. The Contractor and its subcontractors shall cooperate with the inspector by allowing time for inspection. The Contractor will be notified 24 hours prior to the time of the actual inspection. The Contractor is obligated to perform all engineering, obtain permits, and to have all hoisting equipment inspected as required by OSHA, Village, Town, County, State, and Federal regulations as well as any other agency having jurisdiction. Copies of all inspection reports and certificates must be transmitted to Construction Manager as soon as possible.

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

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

O. 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 approves 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. Additionally, when the Owner and/or the Construction Manager reviews the use of 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 regulations, statutes, and requirements. 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 is 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.

P. 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, etc. 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 and Architect will also be back charged to the Contractor. The Contractor, by entering into contract with the Owner agrees to be liable for these costs.

Q. 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.

R. 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 or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them 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 job site, and to all materials delivered to and stored at said job site which are intended to become a part of the completed work covered by the 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.

S. 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 which cause death, person injury, or property damage, giving full details and statements or 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.

T. 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.

U. Any and all fines or citations levied against the Owner, Architect, or Construction Manager due to the failure of the Contractor to comply with regulations 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.

V. The Contractor shall indemnify and hold harmless the Owner, Construction Manager and Architect 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 or indirectly employed by such Contractor, with respect to violations of OSHA requirements, rules and/or regulations.

W. 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 Contract.

X. The Contractor shall indemnify and hold harmless the Owner, Architect, and Construction Manager, of and from any and all liability for violation of such laws and regulations and shall defend any claims or actions which may be brought against the Owner as the result thereof. In the event that the Contractor shall fail to refuse to defend any such action, the Contractor shall be liable to the Owner for all costs of the Owner, 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.

Y. The Contractor and its subcontractors shall indemnify and hold harmless the Owner, Construction Manager and Architect 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, for the act and/or omissions of any Contractor or Subcontractor that

resulted in an incident and/or accident causing 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 contract 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 time 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 drawings or specifications and which will result in additional cost to the Owner, the Architect 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 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. 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 of overhead and profit.

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.

The Contractor shall submit with its change order proposals actual invoices from its insurance broker reflecting actual additional costs associated with the procurement of bonds.

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 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 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 drawings or specifications 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 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 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 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 and Contractor, authorizing a change in the Contract amount or an adjustment to the Contract Sum. No amount shall be payable by the Owner to the Contractor for performance of 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 contract for which the Contractor has been awarded the 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 specifications. 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 form 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 sufficiently in 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 drawings and/or specifications;
- i. the Contractor's failure to notify the Architect of errors or inconsistencies between and among the contract drawings and specifications;
- 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.
- m. The amount requested exceeds the percent completion of 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.

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. The Owner shall make payment to the Contractor within forty-five days of receipt of the Contractor's requisition of payment unless such requisition of payment is not in accordance with the terms of the Construction Documents.

6. 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.

7. 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 if the Contractor obtains security acceptable to the Owner or 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 150% 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 or other acceptable security, 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, 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;
- f. The Contractor must furnish a bill of sale for stored material and/or equipment;

The 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 this agreement 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 its agreement with the Owner, 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.

<REMAINDER OF PAGE LEFT BLANK INTENTIONALLY>

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 for which it and/or its subcontractors shall employ (either directly or indirectly). This information shall be itemized in the format shown below:

Contractor's Name					
Contractor's Address					
Contractor's Office Phone No.					
Contractor's Fax No.					
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					
401(k) Fund					
Other (Explanation Required)					
Other (Explanation Required)					
Subtotal					
Hourly Labor Rate					

ARTICLE 10 INSURANCE REQUIREMENTS

A. The Contractor, at its sole cost and expense, shall provide the Owner with the following insurance coverage whether the operations to be covered thereby are through the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

1. Workers' Compensation:

Coverage	Statutory
Extensions	Voluntary compensation All states coverage employers Employer's liability - unlimited

2. Commercial General and Umbrella Liability

Coverage	Occurrence using ISO occurrence Form CG 00 01 07 98 or later form
Limits per project	General Aggregate - \$2,000,000.00 Products - Completed/Operations - \$1,000,000.00 Personal & Advertising Injury - \$1,000,000.00 Fire Damage (any one fire) - \$50,000.00 Medical Expenses (any one person) - \$10,000.00 Umbrella - \$10,000,000.00

3. Automobile Liability (all vehicles
hired or non hired) \$1,000,000.00 per accident

4. If this project requires the removal of asbestos and/or hazardous materials, Contractors shall provide hazardous material liability insurance as follows:

\$1,000,000 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 Contract. If motor vehicles are used for transporting hazardous materials, the Contractor shall provide pollution liability broadened coverage (ISO endorsement CA 9948) 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 District of the Certificate of Completion.

5. 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 Owner.

If written on a "claims-made" basis, the retroactive date must pre-date the inception of the contract or agreement. Coverage shall remain in effect for two years following the completion of work. The testing company shall also provide proof of Workers' Compensation and NY State Disability Benefits Insurance, Commercial General Liability and Excess Liability with limits of \$2,000,000 each occurrence and in the aggregate.

Coverages shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment.

B. The insurance required to be procured by the Contractor pursuant to paragraph A of this Article 10 shall be purchased from and maintained by an insurance carrier licensed to do business in the State of New York, with an A.M. Best rating of "secured" or better. The Contractor must submit the Certificate of Insurance to the Architect or Construction Manager for the Owner's approval prior to the commencement of any work.

C. All insurance coverage to be provided by the Contractor pursuant to paragraph A of this Article 10 shall include a cancellation notice to the Owner of at least thirty days.

D. All insurance coverage to be provided by the Contractor shall name the Owner, the Construction Manager and the Architect as additional insureds on the policy. Additionally, the insurance coverage to be provided by the Contractor pursuant to paragraph A of this Article 10 shall state that the Contractor's coverage shall be the primary coverage for the Contractor's work.

E. In the event that any of the insurance coverage to be provided by the Contractor to the Owner contains a deductible, or the insurance provided by the Owner contains a deductible, the Contractor shall indemnify and hold the Owner, the Architect and the Construction Manager harmless from the payment of such deductible, which deductible shall in all circumstances remain the sole obligation and expense of the Contractor.

F. The Contractor acknowledges that its failure to obtain or keep current the insurance coverage required by paragraph A of this Article 10 shall constitute a material breach of contract and subjects the Contractor to liability for damages, including but not limited to

direct, indirect, consequential, special and such other damages the Owner sustains as a result of such breach. In addition, the Contractor shall be responsible for the indemnification to the Owner, Architect and Construction Manager, of any and all costs associated with such lapse in coverage, including but not limited to reasonable attorney's fees.

G. The Contractor shall require all subcontractors to carry similar insurance coverages and limits of liability as set forth in paragraph A of this Article 10 and adjusted to the nature of subcontractors' operations and submit same to the Owner for approval prior to start of any work. In the event the Contractor fails to obtain the required certificates of insurance from the Subcontractor and a claim is made or suffered, the Contractor shall indemnify, defend, and hold harmless the Owner, Architect, Engineers, Construction Manager, Consultants, and Sub-consultants and their agents or employees 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.

H. The Contractor assumes responsibility for all injury or destruction of the Contractor's materials, tools, machinery, equipment, appliances, shoring, scaffolding, false and form work, and personal property of Contractor's employees from whatever cause arises. Any policy of insurance secured covering the Contractor or Subcontractors leased or hired by them and any policy of insurance covering the Contractor or Subcontractors against physical loss or damage to such property shall include an endorsement waiving the right of subrogation against the Owner for any loss or damage to such property.

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

K. Before commencement of its work, the Contractor shall obtain and pay for such insurance as may be required to comply with the indemnification and hold harmless provisions outlined under Article 12 of these General Conditions of the Contract for Construction.

L. Review and acknowledgment of the Certificate of Insurance by the Owner, Construction Manager or the Architect shall not relieve or decrease the liability of the Contractor hereunder.

M. 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 himself, to pay premiums, and to charge the cost to the Contractor.

ARTICLE 11
REQUIRED BONDS FOR THE PROJECT

- A. The Contractor shall furnish a Performance Bond and Labor and Material Payment Bond meeting all statutory requirements of the State of New York.
- 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 licensed to do business in New York with an A.M. Best Rating of "A-" or better as to Policy Holder Ratings, and "VII" or better as to "Financial Size Category." 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. A rider including the following provisions shall be attached to each Bond:
1. Surety hereby agrees that it consents to and waives notice of any addition, alteration, omission, change, or other modification of the Contract Documents. Such addition, alteration, change, extension of time, or other modification of the Contract Documents, or a forbearance on the part of either the Owner or the Contractor to the other, shall not release the Surety of its obligations hereunder 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 Lender and the Owner.

J. The Contractor shall deliver the required bonds to the Owner prior to beginning construction activity at the site, but no later than 10 days of 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.

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. The Contractor and its subcontractors shall indemnify and hold harmless the Owner, Architect, and Construction Manager, and all their employees, agents or servants or any third parties from and against any and all claims, damages, losses, suits, obligations, fines, penalties, costs, charges and expenses, including but not limited to attorneys' fees, which may be imposed upon or incurred by or asserted against any of them by reason of any act or omission of such Contractor or any of its subcontractors or any person or firm directly or indirectly employed by such Contractor, for the act(s) and/or omission(s) of any Contractor or Subcontractor in connection with the work of the Project.

B. To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, Construction Manager and agents and employees of any of them from and against claims, damages, losses and expenses including but not limited to attorneys' fees, arising out of or resulting from performance of its work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction, of tangible property including loss of use resulting therefrom, but only to the extent caused in whole or in part by negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed

by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Paragraph 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 Architect's consultants and agents and employees of any of them under any applicable statute, rule or regulation including the New York Statute, Occupational Safety and Hazardous Act, and the Federal Occupational Safety and Hazardous Act. In claims against any person or entity indemnified under this Paragraph 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. The Contractor shall be liable for and shall indemnify and hold harmless (1) the Owner, its consultants, employees, officers and agents, (2) the Architect and its consultants, employees, officers and agents, and (3) the Construction Manager, 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 of these General Conditions of the Contract for Construction.

D. The Contractor shall indemnify and hold harmless (1) the Owner, its consultants, employees, officers and agents, (2) the Architect and its consultants, employees, officers and agents, and (3) the Construction Manager, its consultants, employees, officers and agents, against any actions, lawsuits or proceedings or claims of liens brought against each or any of them as a result of liens filed against the Contractor's project funds, including all the cost and expense of said liens, and including but not limited to attorneys' fees incurred by each or any of them.

E. The Contractor shall indemnify and hold harmless the Owner, the Architect and the Construction Manager of and from any and all liability for violation of any laws and regulations applicable to the Contractor's work and shall defend any claims or actions which may be brought against the Owner as the result thereof. In the event that the Contractor shall fail to refuse to defend any such action, the Contractor shall be liable to the Owner for all costs of the Owner in defending such claim or action and all costs of the Owner, including attorney's fees, in recovering such defense costs from the Contractor.

F. The Contractor shall indemnify and hold harmless the Owner and the Architect of and from any and all liability for claims made by third parties, including subcontractors, in connection with this Agreement and shall defend any claims or actions which may be

brought against the Owner as the result thereof. In the event that the Contractor shall fail to refuse to defend any such action, the Contractor shall be liable to the Owner for all costs of the Owner in defending such claim or action and all costs of the Owner, including attorney's fees, in recovering such defense costs from the Contractor.

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 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 the site 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 its agreement. 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, as of a milestone date, has not progressed or reached the level of completion required by its contract, 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 (3) 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 by its agreement with the Owner. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule.

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 Contractor's agreement with it.

4. The Owner reserves the right to withhold payment from the Contractor until such time as the Contractor submits a daily schedule showing work to be again on schedule with the Construction Schedule and/or until its work is being installed according to the project construction schedule, 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 project manual included as part of its agreement with the Owner. 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. 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 agreement between the Owner and Contractor and as further set forth in the project manual and/or bidding documents. 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 this Contract and the completion date and milestone date for each work item in its agreement, 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 this contract 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 in cases 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) 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 additional inspections are not needed. All costs incurred by the Owner, Owner's Representative 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. 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 the 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 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 contract. 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 or its Architect may be allowed.

3. 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 Architect will have the authority to reject work performed by the Contractor which does not conform to the requirements of the drawings and/or specifications.

B. The Architect 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 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 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 Architect or failing to conform to the requirements of its contract with the Owner, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear the 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 Architect's services incurred in conjunction with such additional testing, and any cost, loss or damages 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 its agreement with the Owner, or (2) fails to carry out its work in accordance with the requirements of its agreement with the Owner, 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 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 its agreement with the Owner 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 its agreement with the Owner 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 twenty-four (24) hours notice of its intention to do so to the Contractor.

G. If the Owner prefers to accept work which is not in accordance with the terms and conditions of the agreement between the Owner and the Contractor, 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 drawings and/or specifications 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 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). Upon completion of the work outlined by the Architect to it in accordance with this paragraph A, 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 services performed by the Architect as a result of 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 drawings and/or specifications. 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. 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 drawings and/or specifications.

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 in applicable special warranty required by the agreement between the Owner and the Contractor, any of the Work is found to be not in accordance with the requirements of said agreement, 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 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 no later 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 pursuant to the terms and conditions of its agreement with the Owner and the Contract fully performed and upon receipt of the closeout documentation required by the Contract Documents and elsewhere in the agreement between the Owner and the Contractor, 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 to the Architect 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 and elsewhere in the agreement between the Owner and the Contractor.

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, the amount of compensation paid to the Architect 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 section 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 and State Laws and all Laws, Ordinances and Regulations of the Owner, in any manner affecting the work and all such orders decreed as 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 all his officers, agents, or servants against any claim or liability arising from, or based on, a violation of any such law, ordinances, regulation, order or decree, whether by himself or by his employee 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 job 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 Contract, 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 Project Manual, and any re-determination of the prevailing rate of wages after the Contract is approved shall be deemed to be incorporated herein by reference as of the effective date of re-determination and shall form a part of this Contract. The Labor Law provides that the Contract 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, Sub division 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 this contract or any sub-contractor hereunder, no contractor, sub-contractor, nor any person acting on behalf of such contractor or sub-contractor shall by reason of race, creed, color 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, sub-contractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, color, creed, sex 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 the Contract.
4. This Contract 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 section covering every Contract for or on behalf of the Owner, the State or a municipality for the manufacture, sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the State of New York.

G. The successful 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. The Contractor shall and does hereby agree to fully indemnify, protect, defend, and hold harmless the Owner, Owner's agents 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. This Contract 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 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 state laws, local ordinances, requirements of governmental agencies having jurisdiction, and applicable requirements of 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. 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. 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 the Contract 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 race, religion, color, sex or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices 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 race, religion, color, sex or national origin.

ARTICLE 17

TERMINATION OR SUSPENSION

A. 1. The Owner may terminate the Contractor's agreement 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, and 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. disregards laws, ordinances, rules, regulations, or orders of a public authority having jurisdiction;
- e. disregards the instructions of the Architect, Construction Manager or the Owner (when such instructions are based on the requirements of the Contract Documents);
- f. 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; or
- g. breaches any warranty made by the Contractor under or pursuant to the Contract Documents.
- h. 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; or
- i. 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.
- j. fails to keep the Project free from strikes, work stoppages, slowdowns, lockouts or other disruptive activity;
- k. or otherwise does not fully comply with the Contract Documents.

2. When any of the above reasons exists, 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 site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- b. take possession of materials stored off site by the Contractor;

- c. take assignments of the Contractor's subcontractors in accordance with these General Conditions;
- d. finish the Work by whatever reasonable method the Owner may deem expedient.

3. When the Owner terminates the Contract for one of the reasons stated in Subparagraph 1 hereof, 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.

4. In the event a court or other tribunal issues a final determination that Owner's termination for cause was arbitrary, capricious or otherwise without cause and/or reverses Owner's termination for cause, such termination shall, without further action on the part of Owner, be converted to a termination for convenience, as set forth in (B), below.

B. 1. In addition to the Owner's right to carry out the work of the Contractor pursuant to its agreement with the Contractor, 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 paragraph. If the Contractor's work is so terminated, 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 its agreement and prior to the effective date of termination (the basis for such payment shall be as provided in the Contract) and for costs directly related to work thereafter performed by Contractor in terminating such Work, provided such work is authorized in advance by the Architect and the Owner. No payment shall be made by Owner, however, to the extent that such work is, was, or could have been terminated under the Contractor's agreement with 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 materials, supplies, equipment or other items that are to be disposed of by the Contractor that are part of the Contract Sum; multiplied by 15% representing the Contractor's overhead and profit.

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 Contractor's agreement with the Owner 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 its agreement with the Owner, 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 contract pursuant to this section.

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 Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract.

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 claimant first recognizes the condition giving rise to the Claim, whichever is earlier. Claims 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 the Contract 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 site 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 site 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 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.

F. Claims for Additional Time. If the Contractor wishes to make Claim for an increase in the Contract Time, the Contractor shall comply with the requirements set forth in Article 13.

G. Nothing contained in the Contract Documents shall relieve a Contractor from compliance with any statutory requirement, including, but not limited to those contained in Education Law Section 3813.

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; 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 (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 mail or overnight delivery 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. All notices to be given to the parties hereto shall be sent to or made at the addresses set forth hereinbelow. 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 agreement between the Owner and the Contractor, duties and obligations imposed by such agreement 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 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 this Agreement 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.

H. The rights stated in these General Conditions and the 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 its agreement with the Contractor.

J. The Owner shall not be liable to the Contractor for punitive damages on account of any its 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. As between the Owner and Contractor:

1. Before Substantial Completion. As to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion;

2. Between Substantial Completion and Final Certificate for Payment. As to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment; and
3. After Final Certificate for Payment. As to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to warranties provided in accordance with its agreement with the Owner, the date of any correction of work performed by the Contractor or failure to correct its work, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or Owner, whichever occurs last.

N. 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 and performance 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, torn out or replaced.

O. The Contractor agrees not to assign, transfer, convey or sublet or otherwise dispose of this Contract or his right, title and interest therein or his power to execute such Contract, to any other person, firm or corporation without the previous consent in writing of the Owner.

P. The Owner is a tax exempt organization and will take title to materials used in the Project in order to permit tax exemption.

Q. The Owner will furnish a certificate with the Owner's Tax Exemption Number to the Contractor for use in purchasing tangible personal property required for the Project.

R. 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.

S. 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

SPECIAL PROVISIONS

These Special Provisions are in addition to the Plans, Specifications and the other Contract Documents and shall be part of this Agreement between the Owner and the Contractor. All references to "This Prime Contractor", "This Contractor" or "Contractor" refer to the General Contractor, Mechanical Contractor, and Electrical Contractor. In cases of contradictions, the most stringent Provision shall govern.

GENERAL REQUIREMENTS FOR EACH PRIME CONTRACTOR**1.01 GENERAL**

- A. All dates, durations, etc. defined herein shall be in business days.
- B. Except for the basic building permit, each Prime Contractor's price shall include all fees and other costs for securing and maintaining (by the Prime Contractors or their subcontractors) for the life of the job; all permits, PE licenses, connection fees, inspections, etc., applicable to, or customarily secured for the Work. This provision includes any applications and/or permits to be issued by utility companies in the name of the Prime Contractor, or the Owner, as required for the Work. Originals of all permits are to be issued in the name of the Prime Contractor as required for the Work. The Prime 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 agreed to with the Construction Manager.
- C. One week after Notice to Proceed (NTP), each Prime Contractor shall provide two copies of a videotaped 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 Prime Contractor shall be responsible for paying the costs associated with any and all repairs or replacements of existing materials and/ or conditions that were damaged in an area where the Prime Contractor is working or has worked, as may be deemed necessary by the Owner or the Construction Manager.
- D. Each Prime Contractor is responsible for providing the required mock-ups defined by the Contract Documents out of sequence as needed by the Architect.
- E. Each Prime Contractor is responsible for providing all required engineered material calculations as defined by the contract documents.
- F. Each Prime Contractor shall provide drinking water for his own employees.
- G. On Site Communications. Each Prime Contractor shall provide, or otherwise see that, the project manager, or site managers, and/or responsible workers of each Prime Contractor and major subcontractor are equipped with cellular phones for the purpose of staying in contact with for the Construction Manager.
- H. Each Prime Contractor shall include in his base price the cost of all rigging and equipment required for the performance and installation of the Work.

1.02 SCHEDULE

- A. All Contractors are to recognize that the Project Schedule is of critical importance to the Owner. All aspects of construction must reflect a 'time is of the essence' construction strategy. The

attached 'Bid Schedule' serves as a guide of critical milestone dates to the Project. Failure to meet intermediate milestone dates will jeopardize the overall Project Schedule. This failure will mandate Contractor(s) to, increase staff, work overtime, or use other means to recover time, at the costs of those Contractor(s) responsible for such delays. In addition, all costs due to delays in completion of the Work, which require additional Custodial Overtime, Construction Management services, Architectural services, and Engineering services beyond the Work duration in the Bid Schedule, shall be borne by Contractor(s) responsible for delays.

- B. All Prime Contractors shall review the completed "Final" detailed construction schedule and acknowledge their acceptance of this schedule by signing a copy to be kept on record by the Construction Manager. This agreed upon schedule must incorporate all milestone dates and shall be established within five (5) days of Notice to Proceed.
- C. The Prime Contractor for General Construction shall update and maintain the detailed construction schedule with the Construction Manager and issue copies to the other Prime Contractors, the Owner, Construction Manager, and the Architect monthly. Each Prime Contractor shall provide the Prime Contractor for General Construction with all information necessary to provide these updates.
- D. Each Prime Contractor is to submit a schedule of projected fabrication on long lead items (items requiring four weeks and over to fabricate) 5 days after Notice to Proceed. Progress/Status reports on fabrication to be submitted to the Construction Manager every two weeks. 'Rate of Change' chart and marked up shop drawings to be included in these reports.
- E. The Prime Contractors shall be responsible for coordinating and expediting their fabrication and delivery schedules and keeping the Construction Manager informed as to their progress and their anticipated ability to stay on schedule. Should it become necessary (in the opinion of the Construction Manager) to supplement the Prime Contractor's expediting efforts in order to maintain job progress, the Construction Manager may elect to charge all costs incurred to said Prime Contractor.
- F. In the event that Owner makes special arrangements to open a building at the request of a Contractor and the Contractor does not show, the Prime Contractor shall pay the Owner all costs incurred. All parties agree that any action taken to enforce this requirement shall not be construed by any Prime Contractor or its subcontractors/suppliers, as a reason for a claim (for either time or money) for delay to the Work or to the Prime Contractor, its subcontractors, or suppliers.
- G. The Owner shall take partial occupancy of the renovated spaces in accordance with the dates established by the Bid Schedule and the Special Provisions. The Contractors shall perform all Work necessary to maintain the Owner's move-in and occupancy schedule.
- H. The Contractors shall include in their base price, all out of sequence Work and any Work required to be performed during overtime hours or non-working hours necessary to maintain the Master Schedule, the Prime Contractors' project schedule, or, the Owner's move-in schedule.

MILESTONE REQUIREMENTS

Submittal Priorities

The following submittal dates are critical to allow for proper fabrication timeframes to ensure timely completion of the project to meet the attached bid schedule. A complete listing of all submittal requirements is located in "Section 01 33 00 Submittals"

Major General Construction Submittals

Logistics Plan	5 days from Notice to Proceed
Asbestos Abatement	15 days from Notice to Proceed
Cast in Place Concrete	15 days from Notice to Proceed
Unit Masonry and Mortar	15 days from Notice to Proceed
Structural Steel and Decking	15 days from Notice to Proceed
Misc. Metals	15 days from Notice to Proceed
Wood	15 days from Notice to Proceed
Openings	15 Days after Notice to Proceed
Finishes	15 Days after Notice to Proceed
Equipment	15 days from Notice to Proceed
Specialties(signage, toilet bath & laundry accessories)	15 days from Notice to Proceed

Major HVAC Equipment

Mechanical System Identification	15 days from Notice to Proceed
Instrumentation and Control Integration	15 days from Notice to Proceed
Sequence of Operations	15 days from Notice to Proceed
RTU's/UV's/Unit Heaters	15 days from Notice to Proceed
Exhaust Fans	15 days from Notice to Proceed
Ductwork	20 days from Notice to Proceed
Registers and Diffusers	20 days from Notice to Proceed
All remaining Submittals with-in	25 days from Notice to Proceed

Major Electrical Equipment

Identification for Electrical Systems	15 days from Notice to Proceed
Low Voltage Electrical Power Conductors and Cables	15 days from Notice to Proceed
Raceways and boxes for Electrical Systems	15 days from Notice to Proceed
Hangers and supports for Electrical Systems	15 days from Notice to Proceed
Power wiring and Conduit	15 days from Notice to Proceed

Wiring Devices	15 days from Notice to Proceed
Lighting	15 days from Notice to Proceed
Fire Detection and Alarm	15 days from Notice to Proceed
Public Address/Intercom	20 days from Notice to Proceed
Auditorium Dimming, Control, Stage Rigging and	
Lighting Fixtures	20 days from Notice to Proceed
Communications—Theatre Sound and Video Systems	20 days from Notice to Proceed
All remaining Submittals with-in	25 days from Notice to Proceed

Major Plumbing Equipment

Expansion fittings and loops for plumbing	15 days from Notice to Proceed
Piping and accessories	15 days from Notice to Proceed
Hangers and supports	15 days from Notice to Proceed
Piping insulation	15 days from Notice to Proceed
Identification for plumbing and equipment	15 days from Notice to Proceed

CONSTRUCTION MILESTONES**All Prime Contractors**

Special consideration should be made to the requirements of the project bid schedule attached in the Specifications. Prime Contractors will be required to man each contract to meet the milestone dates indicated below and/or in the contract bid schedule. All costs should be included in the bid for working multiple shifts, nights, weekends, and holidays to complete each phase of the project.

Time frames indicated, show milestone dates required to be met by all Prime Contractors. These areas, once completed, will be punch-listed and given partial occupancy for the Owner to occupy. Occupying these areas is critical to the Owner. If said dates are not met Liquidated damages may be assessed and back-charged to the responsible Contractor.

Key Milestone Dates**Farragut Middle School & High School Renovations**

Construction Start Approximately September 13, 2021, Substantial Completion, February 15, 2022, Final Completion March 1, 2022 – Approximately 6 month project

Summary of Work

The Renovations to the Farragut Middle School/High School Project consists of a full renovation of the auditorium on the 4th floor of the building. The work consists of, but is not limited to spot demolition, coordinating the schedule and installation of new seating, strip, sand, stain and patch existing hardwood floor, crack and plaster wall repair, new stairs to stage, blocking for new a/v equipment, alcove for new projector, new stop height at existing elevator, new air conditioning system, new bathroom (add/alt), new a/v equipment (add/alt) and production lighting (add/alt).

This work will take place when school is in session. Access to the auditorium will be via the exterior stair scaffold on Farragut Ave. The staging area will be in the school parking lot as shown in the plan. Work hours will be from 7AM-3:30PM. Any scope of work performed outside of the auditorium must be performed during after hours/weekends up to and including electric pipe runs, plumbing pipe runs, and crane picks. The schools' construction manager must be notified in advance of this work. If work occurs during after hours, noise shall be limited to the inside of the building after 8PM, as the town does have a noise ordinance in place.

Consult the Staging Plan for additional information on staging area. All roadways, access, and egress points must remain open and clear of debris daily for emergency equipment and public access.

SCHOOL OPERATIONS & CONTRACTOR WORK HOURS

The work can not in any way impact school operations. Deliveries can only be accepted either before 7:45 or after 9AM, strictly limited to the staging area. The schools' elevators can be utilized for smaller material only during those hours. All contract work affecting the Operation of the School must be performed on an after-hours schedule, weekends or school holidays.

Each Prime Contractor may work Saturday & Sundays to make up for lost time (Saturday/Sunday work will be required if necessary, to meet deadline) with prior approval from the Owner and after Contractor has verified allowable working hours by town ordinance.

All Contractors will provide in their base bid (15) fifteen "black out days", per school year, to the construction schedule where no work can take place due to state testing. These dates will be determined by the District and have been incorporated into the milestone dates indicated in the attached bid schedule.

1.03 SAFETY/LOGISTICS/STORAGE

- A. Two weeks after the receipt of the Notice to Proceed, the Prime Contractor for General Construction 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, traffic plans for deliveries and removals, refuse container locations, crane locations, pick locations, boom radius, and lift locations. This plan shall also show the location of all staging and storage areas, non-rated and fire-rated partitions used to separate construction and school areas, made with plywood and/or gypsum wallboard, etc. The logistical information represented by the construction documents shall serve as a minimal guide.
- B. Each prime contractor is to submit their corporate safety policy (5) five days after notice to proceed. Plan to minimally meet OSHA standards. Each Prime Contractor shall make the participation of their subcontractors in this program mandatory. These Safety Programs should be a detailed Company Policy defining the specifics as to how a safe work environment shall be maintained.

- C. Each Prime Contractor and Sub Contractors shall schedule weekly safety meetings (Job Site Safety Talks) and submit meeting minutes indicating attendees and topics to the Construction Manager.
- D. Each Prime Contractor is to identify in writing to the Construction Manager their "OSHA Competent Person Regarding Safety" Definition. "Competent person" means one who is 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.
- E. All flagmen required for deliveries to the site are to be furnished by the Prime Contractor 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. All deliveries shall be scheduled and coordinated with the Construction Manager and the Owner. Delivery blackout periods for bus traffic interference shall be established with the Construction Manager. Additionally, proper signage/cones/barriers etc. shall be furnished in a case of equipment or trucks being used outside of the construction fence.
- F. Smoking, firearms, alcoholic beverages, and indecent photography are expressly prohibited on all school properties. All persons representing Contractors, subcontractors or suppliers shall wear shirts, long pants and other proper attire while on school property. All persons representing Contractors, subcontractors or suppliers shall conduct themselves in a professional manner consistent with the rules and policies of The School District, and the New York State Education Department while on school property or otherwise representing this project.
- G. Each Prime Contractor will ensure that all their employees, while on school property, will wear hard hats, high visibility vests, and ID badges at all times. Anyone on site without this safety gear will be escorted off school property.
- H. Each Prime Contractor will ensure that every employee working on this project has completed a 10-hour OSHA training course. Any worker that cannot present a 10-hour OSHA safety-training card will be escorted off the property.
- I. Food truck vendors for Construction Workers will only be allowed on school property with prior authorization from the School District. The District may allow or discontinue food vendor truck service at any time for any reason.
- J. **Identification Badges**. Each Prime Contractor will provide an ID badge for each of their field personnel prior to coming on school property. All workmen shall display the badge on their person while on site, and at all times. Failure to wear identification badge at all times will result in the immediate removal from the jobsite.
- K. Each Prime Contractor is responsible for their own storage and personnel trailers at each site. Each Contractor will be required to supply man trailers and storage box trailers as required. All costs related to its delivery, construction, protection, power, etc. is borne by the individual Contractors utilizing space. **The Owner WILL NOT PROVIDE STORAGE SPACE.** The placement of these trailers will be strictly limited to predetermined locations. Approval of the placement of any trailer or storage box must be received from the Construction Manager. Removal and/or Relocation of said trailers due to underlying work is at the expense of the contractor utilizing it.
- L. The parking for construction personnel shall be limited to designated parking areas only during summer sessions. No on-site parking will be allowed during the school year. Failure to abide by

this rule will result in towing of cars at the expense of the Prime Contractor whom employs the individual.

- M. All delivery vehicles/trucks/machinery/etc. permitted on site, must be equipped with back-up alarms and enter through the designated access points. Failure to demonstrate this ability will result in cancellation of delivery or stoppage of work. All delays associated with this cancellation will be the responsibility of the Prime Contractor responsible for the Work involved.
- N. All temporary construction site fences shall be installed with a tightly woven, blind screen mesh. This mesh is to be installed on the "construction" side of the fence. The General Contractor will maintain all fencing daily and lock gates at the end of the day.
- O. All crane picks, material delivery, etc. must be coordinated so as not to lift over any occupied area of the building. If absolutely necessary, this work shall be done on off hours to ensure the safety of the building occupants. Crane location must be carefully chosen to ensure the safety of building occupants.
- P. The Owner or Construction Manager reserves the right to have all hoisting equipment periodically inspected by an independent inspector whose findings will be binding. The Prime Contractor at its own expense must make corrections before continuing work. The Owner or Construction Manager will not assume any responsibility for the safe operation of any hoisting equipment by exercising this right. Each Prime Contractor or Sub Contractor shall cooperate with the inspector by allowing time for the inspection. The Prime Contractor shall be notified 24 hours prior to the time of the inspection. These inspections do not release the Prime Contractor of their responsibility to provide all engineering, permits, and inspections as required by OSHA or the SED prior to use of any hoisting equipment.
- Q. All vehicular traffic (personal vehicles, trucks, equipment, deliveries, etc.) are to use the designated entrances as outlined on the Logistics Drawings. Access by other routes is to be on exception basis only.

1.04 **SUBMITTALS**

- A. Each copy of each submittal shall have attached as the cover page the "Submittal Cover Sheet". All information requested in "Section 01 33 00 Submittals" shall be provided by the respective Contractor. Submittals will be returned without review if the cover sheet is not accurately completed.
- B. Each Prime Contractor shall generate a complete "Submittal Log" within one calendar week of the Notice to Proceed. This log is to list all required submittals specific to your trade as detailed in the Project Manual/Specs. See enclosed form for your use. "ROJ" stands for Required on Job to assist your judgment of the time gap between submission, Architect review, fabrication/procurement and on-site need for putting the work item into place.
- C. Each Prime Contractor shall review all submissions for completeness. Each Prime Contractor is responsible to stamp all shop drawings prior to submission to the Architect. The Architect will not review any shop drawings unless first reviewed by said Contractor. Bundle similar material submissions for proper review. Use the Architects Submittal cover sheet located in the Specifications
- D. **All submissions shall be sent electronically to the Architect. Submittals will be processed and stored electronically, with access available to all Prime Contractors for coordination.**
- E. Each Prime Contractor shall provide one transmittal for each submission package identifying each unique submission individually. For each submittal with the submission package, the

Prime Contractor shall identify the length of the delivery time and the necessary "last date" an item may be received on site. Each Prime Contractor shall keep a log of all submissions in a manner prescribed by the Construction Manager and the attached form. Minimally, the Contractor shall update this submittal log biweekly and provide a copy to the Construction Manager for review and information.

- F. Each Prime Contractor shall copy the Construction Manager's Project Manager on all transmittals, correspondence, RFI's and any other documents sent to the Architect, his consultants or the Owner.
- G. At the direction of the Construction Manager, the Prime Contractor shall provide copies of either document and/or data files for any requested document on one of the following programs: Microsoft Word, Microsoft Excel, or Primavera's SureTrack – Project Manager 2.0 scheduling program.

1.05 **MANAGEMENT OF WORK**

- A. **Each Prime Contractor shall employ (from one week after Notice to Proceed until punch-list and closeout are complete) at a minimum a full time Project Manager and full-time on-Site Super. The Project Manager and Site Super shall represent the Prime Contractor. All communications given to the Project Manager or Site Super either verbal or written shall be as binding as if given to the Prime Contractor. Important communications shall be so confirmed in writing.**
- B. Each Prime Contractor shall provide copies of their daily construction reports to the Construction Manager's Project Manager. These reports shall be submitted no later than 10:00am the following workday. The daily reports shall provide detailed information concerning the Prime Contractors' activities and operation only. Daily Construction Reports to the owners' representative detailing manpower and work activities on site. A "Daily Construction" form is attached and shall be used for reporting these said activities. In addition, the Contractors are to submit Two Week Look Ahead schedules at every construction meeting which describes coming work in detail.
- C. Each Prime Contractor shall have responsible representation at the **MANDATORY** weekly job meetings held at the Construction Manager's job office from notice to proceed thru close out. These meetings will be held to arrange for a satisfactory coordination of all building trades so as not to impede job progress. Prime Contractors or subcontractors who fail to attend the meetings will be back-charged \$500.00 per each occurrence.
- D. Each Prime Contractor shall submit two-week look ahead schedules identifying the anticipated activity, and material needs for all of the work scheduled to be formed by the Prime Contractor and his subcontractors for the identified time period. The Prime Contractor shall keep this schedule current and provide a biweekly report to the Construction Manager concerning the actual performance and activity compared to the two-week look ahead.
- E. If any Prime Contractor fails to keep the site safe and clean within four hours of being notified by the Construction Manager either verbally or in writing, the Construction Manager will have this work performed and back charged to the appropriate Prime Contractor at prevailing overtime rates plus 15%. Notice to field personnel is deemed notice to this Prime Contractor.
- F. Dust and fume control are essential to the reduction of health risks to the surrounding personnel. Methods of dust control shall include but not be limited to the following:
 - 1. Adequate ventilation.
 - 2. Wetting down.
 - 3. Keeping bags of insulating materials, cement, etc. closed.
 - 4. Controlled mixing of materials under field conditions.

5. Special attention should be utilized in sawing of insulation and certain acoustical materials and storage of materials.
 6. Job housekeeping must be maintained.
 7. Advising all personnel of hazardous conditions, including supervisors and workmen.
 8. Each Prime Contractor shall be responsible for instituting the above policies to ensure minimal impact to surrounding occupied areas.
- G. Each Prime Contractor shall confine operations on the premises to areas designated by the Construction Manager and permitted by law, ordinances, permits and the Contract Documents, and shall not unreasonably encumber the Premises with any materials or equipment. The Prime Contractor shall coordinate all of his operations with, and secure approval from, the Construction Manager, before using any portion of the Premises. Field personnel are to be confined to the work area assigned.
- H. Where material is specified to be furnished by others or furnished and delivered only, the Prime Contractor installing the material shall be responsible for scheduling the delivery and receiving, unloading, storing, handling, relocating, hoisting, distribution, laying out and installing this material. Upon receipt by the Prime Contractor installing the material, risk of loss and damage shall be borne by that Contractor.
- I. All Prime Contractors and their subcontractors shall allow sufficient time to inspect and accept the work of the previous Contractors. Should any discrepancies be discovered, The Construction Manager shall be notified sufficiently in advance so that corrective action can be agreed to and taken (by all necessary parties) without affecting the progress of any Contractor or the work.
- J. All Prime Contractors are advised to exert utmost care and diligence when working in or near any existing buildings or site work which is to remain. The absence of protection around such items shall not excuse the Prime Contractor from his liability to provide protection. Any damages to the existing buildings, sitework or facilities shall be repaired and expensed to the responsible Prime Contractor.
- K. Each Prime Contractor shall be solely responsible to remove and replace the existing ceiling tiles and grid in areas of the existing building where their work is required but new ceilings are not scheduled. In the event that the existing ceilings are damaged and cannot be replaced to the satisfaction of the Owner, the responsible Prime Contractor shall be solely responsible for replacing, in kind, the existing ceilings with new tile and grid. A qualified Contractor, acceptable to the Owner, shall perform all ceiling replacements.
- L. All disconnect and/or tie-in work involving any utilities that would interfere with the ongoing operations of the Owner shall be completed on an after-hours basis. The performance of this work shall be projected on the required schedules and the Owners Representative is to be notified at least forty-eight hours in advance of commencing with this work. All overtime and standby personnel necessary to complete these tie-ins shall be the responsibility of the Prime Contractor performing the work.
- M. At the same time the Prime Contractor submits their Insurance Certificate they shall also submit to the Construction Manager the labor rates of each category of labor for which he or his subcontractors shall employ (either directly or indirectly). This information shall be itemized in 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		Journey man	1.5 Rate	Fore man	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					

1.06 **REQUEST FOR INFORMATION (RFIS)**

- A. Please refer to the specifications for Construction Phase Clarifications-Request for Information from Architect's Office" for a complete explanation of the process and copy of RFI form.

1.07 **TESTING/INSPECTIONS**

- A. If the Architect or Owner determines that any work requires special inspection, testing or approval, the Owner's Representative will instruct the Prime Contractor of such special inspection, or testing. If such special inspection or testing reveals a failure of the work to comply with the requirements of the Contract Documents, the Prime Contractor shall bear all costs thereof, including compensation for the Architect's, Owner's Representative's, and Testing Lab costs.

- B. Contractor shall furnish incidental labor to:
 - 1. Provide access to the work to be tested, sampled, and inspected.
 - 2. Obtain and handle samples at the project site or at the source of the product to be tested.
 - 3. Facilitate inspections, samplings and tests.
 - 4. Coordinate with the Owners Rep and testing lab and submit schedule of required tests one week in advance.
 - 5. Coordinate inspections
- C. As they relate to the timely prosecution of the work, all Prime Contractors shall coordinate independent testing and inspections. If any Prime fails to coordinate such inspections and additional costs are incurred to the Owner, the Prime Contractor will be responsible for that inspection cost.
- D. The following is a list of intended inspections:
 - 1. Concrete field and plant testing & rebar placement
 - 2. Masonry or stone field inspection, mortar sampling, reinforcement placement inspection
 - 3. Structural steel field welding, bolting, connections, and metal deck
 - 4. Roofing, flashing, waterproofing
 - 5. Firestopping
 - 6. Fireproofing
 - 7. Asbestos air monitoring
- E. Architect and Owner's Representative shall be notified forty-eight hours prior to the need of testing, in the event the Contractor does not give proper notification and the work is done with no test, that Contractor will bear all costs for such tests.
- F. ***All testing costs will be paid for by the Owner except as noted above.***
- G. As part of the two-week look ahead, the Prime Contractor shall provide the Construction Manager with a schedule of all anticipated on-site Owner supplied inspections (if any are required). The Prime Contractor shall submit all requests for Owner-supplied inspection for all items of controlled inspection by 1:30 p.m. of the day previous.

1.08 **CHANGES TO THE WORK**

- A. Refer to the General Conditions for additional information pertaining to this subject.
- B. All change proposals for extra work by the Prime Contractors shall be submitted to the Construction Manager, with a complete labor and material breakdown and on the basis of net difference in quantities. The Owner reserves the right to request adequate back up such as invoices, subcontractor quotes, etc., to substantiate the change order cost. Current labor rates for all trades are to be submitted to the Construction Manager by the respective Prime Contractors at the first scheduled job meeting. When both additions and deductions are involved in any one change, the allowance for overhead and profit shall be figured on the basis of net increase or decrease. All change requests shall include the following breakdown:
 - 1. Materials (itemized breakdown)
 - 2. Rental of equipment (itemized breakdown)
 - 3. Labor (itemized breakdown)
 - 4. Insurance
 - 5. **Subtotal**
 - 6. Overhead 10%
 - 7. **Subtotal**
 - 8. Subcontractor work (same as above, subcontractor O & P 10%)
 - 9. **Subtotal**

10. Profit 5%
11. **Subtotal**
12. Bond charges 2%
13. **Total change order**

1.09 **SCHEDULE OF VALUES/PAYMENTS**

- A. Within one week after Notice to Proceed, the Prime Contractor shall submit a detailed billing breakdown on the AIA G732/ G703 form for approval by Construction Manager. No payments will be made until such billing breakdown is approved.
- B. The schedule of values will be reviewed and adjusted if necessary. Once approved, the schedule of values is to be used for the AIA pay application. The schedule of value will take into account and include at minimum the following items:
 1. Bond/insurance based on actual invoice amount
 2. Labor and material on line items as applicable
 3. Submittals - 1% of contract sum
 4. Punch list - 1% of contract sum
 5. Close-out documents/warranties - 3% of the contract sum
 6. Meeting Attendance & Meeting Documentation - 2% of the contract sum
 7. Allowances
 8. Approved Alternates
 9. Labor and Material breakdown for each line Item

Note: Punch list value will be dispersed only when the work has been confirmed to be completed 100%. ALL PAYMENT APPLICATIONS SHALL INCLUDE A 5% RETAINAGE FACTOR.

- C. The Owner has elected to require the Prime Contractors to submit releases of liens with respect to all Work previously performed and for which payments were made under a preceding application. Beginning with the second payment requisition and with each subsequent payment requisition, each Prime Contractor shall furnish to Owner the following documents:
 1. Labor and/or Materials Affidavit
 2. Daily and Weekly Wage Affidavit
 3. Prime Contractor's-Partial Release and Wavier of Lien
- D. Monthly Payment Applications for Payments shall be made as per Article 9 of the General Conditions of the Contract.

1.10 **PUNCH LIST:**

- A. Upon substantial completion of each phase of work, the Prime Contractors are to submit to the Owner/Construction Manager a letter declaring the work is substantially complete. Included with said letter is to be the Contractor's punchlist. Upon the receipt of above, the Construction Manager will schedule with the Owner, Architect, and Contractor a walk through to develop a single final punchlist. This single final punchlist agreed by all parties shall serve as the only punchlist. Upon failure to complete the final punchlist within two weeks from receipt, the Owner reserves the right to complete same and back charge the costs of material, labor, supervision and other incidental costs.

1.11 **INSURANCE/INDEMNIFICATION**

- A. All Prime Contractors must issue a Certificate of Insurance with liability limits as defined in the Construction Documents naming Triton Construction Company, The Architect, and the School

District as an 'Additional Insured' in addition to all other parties as stipulated in the General Conditions of the Contract in the project manual.

- B. All Prime Contractors agree to indemnify and hold harmless Triton Construction Company, The Architect, the School District, its agents and employees in addition to all other parties as stipulated in the General Conditions of the Contract in the project manual.
- C. All Prime Contractors and Sub-Contractors/sub-subcontractor's/vendors/etc. Insurance/indemnification shall comply with Article 10 "Insurance" and Article 12 "Indemnification" as specified in the General Conditions of the Contract in the project manual.

SPECIFIC SCOPE REQUIREMENTS FOR EACH PRIME CONTRACTOR

PRIME CONTRACTOR FOR GENERAL CONSTRUCTION (PCGC)

- A. This Prime Contractor shall provide, for all new building construction, and existing building renovation work, all necessary site refuse containers and disposal services to maintain the site in a clean and safe condition. This Prime Contractor will provide container service for all the other Prime contractors excluding the Civil/Site Work Prime Contractor. This Prime Contractor shall be responsible for emptying and/or replacing all containers on a regular basis or when full. All containers and disposal services shall be provided by a single entity.
- B. This Prime Contractor for General Construction will employ the necessary laborer for the purpose of maintaining general housekeeping and safety of the work area, by providing daily broom cleaning as necessary.
- C. This Prime Contractor will provide a flag person, when required, at the entrance gates and Public roadways to coordinate deliveries for their work from the street and protect the public.
- D. This Prime Contractor shall coordinate with the; Electrician, Plumber, Mechanical, and Civil/ Site Contractors to allow all Contractors unabated access to the building and surrounding work areas.
- E. This Prime Contractor shall provide and maintain temporary chemical toilets for the duration of the project for all Prime Contractors. The quantity of these toilets should be as required to properly maintain sanitary facilities and easy access for the personnel on the job. This quantity shall be one toilet for every ten workers, and a minimum of two toilets per major work area. This requirement shall include all necessary paper products, supplies and services, as well as the maintenance of these toilets until all work is complete and the Owner assumes partial occupancy of the building additions and renovations. As a minimum, this Contractor shall include the pumping and servicing of these toilets twice per week.
- F. All Scaffolding or stair towers over 25' in height shall be designed and stamped by a licensed NYS PE. When designing this scaffolding consideration should be given to the environment, scaffolding system being used, means of access, means of tying the scaffolding to the structure, location, length of time to be erected, climate conditions, wrapping/containment of building, purpose of use, loadings, etc. all scaffolding and/ or stair tower access points must be secured while not in use. If and when needed, the scaffolding may be used for access by other Prime Contractors during construction- this contractor will not restrict access by others using the scaffold.

This Prime Contractor shall provide testing and inspection of the scaffolding on a daily basis and per governing regulation (e.g., OSHA). A log of these inspections is to be kept in the PCGC's job trailer, along with inspections tags that identify the status of the scaffolding (inspection dates, okay to use, caution, danger). Report to the Construction Manager all corrective work required through the course of the project.

- G. This Prime Contractor for General Construction will provide, maintain, and remove all temporary construction fencing enclosing construction work areas, or storage and trailer park areas. This contractor will provide temporary RCA stone base material for trailer, storage, parking, and laydown areas.
- H. As shown on the logistics plan, this Prime Contractor shall include in his bid price, all costs to provide an 8' ht. rental type chain link temporary construction fencing and gates. All fencing shall have a tightly woven, blind screen mesh installed on the "construction" side of the fence. Mesh to be dark green or black. When directed by the Construction Manager, this Prime Contractor shall remove and dispose of this fencing and all related materials. Gates for man access shall be passive to the exterior of the jobsite during the event of an emergency but remain closed for un-authorized entry during construction. All gates shall be chain locked when the site is not active, with a double-keyed system, granting the District access to the site after-hours
- I. This Prime Contractor shall provide and maintain all temporary plastic barriers, partition walls, doors, hardware and plywood barriers for the duration of the project to separate work areas from public areas and to maintain security, dust, and noise control. Temporary partitions and doors will be painted with 1x coat of primer and 2x coats of paint for aesthetics.
- J. Construction Signage: The Prime Contractor shall include in his base price all construction signage required by OSHA. At the site fence, "Construction Area keep out", "Hard Hats Required" and "Authorized personal only" signage shall be posted every 25' on site fencing. This Prime Contractor shall reference the logistics plans for each project to include any other signage designated for entry gates. Signs shall be made of either metal or durable PVC to endure the project duration.
- K. Professional Cleaning: The PCGC shall provide a professional commercial cleaning service to prepare all areas of interior construction for use and to provide a final cleaning after substantial completion is achieved and after direction to provide such service is received from the Construction Manager. This work shall be completed in cooperation with the building maintenance staff and their respective procedures. As part of this service, the PCGC shall wax all new or repaired floors, and wash or clean all walls, doors, windows, frames, casework, blinds, unit ventilators, shelves, counters, toilet fixture, sinks, equipment, etc. All work shall be performed in place or on site and does not include sending items out for service or special cleaning operations. Building Services shall provide this Contractor with the necessary paper products, hand soaps, trash liners and other products to fill (one time) any dispensers or in order for these items to be prepared for use.
- L. Unless specifically noted on the contract documents, this Prime Contractor for General Construction will provide all concrete equipment pads as shown on the contract documents inside the building footprint.
- M. This Prime Contractor is responsible for protection of finished work. Including but not limited to, floors, walls, and doors. This General Contractor will provide, maintain, and remove the appropriate protection materials necessary to adequately protect his finished product.
- N. This Prime Contractor should note there are numerous areas where the existing ceilings are remaining. This Contractor will be required to remove and reinstall any ceilings displaced by installation of this Contractor's Work. If open ceilings are not replaced within a twenty-four-hour period after a request by the Construction Manager, either verbal or written, the Construction Manager will have said ceilings reinstalled and all related costs will be back charged to said Contractor.
- O. Unless otherwise noted in the construction documents, this Prime Contractor will repair and patch all existing building walls, floors, and ceilings to match adjacent finishes after the removal

of interior partitions, ceilings, floors. Each Prime Contractor will cut and cap and patch their own work inside finished walls, floors and ceilings.

- P. This prime contractor will coordinate with contractors M,E,P for the demolition and installation of ceilings throughout building in order for plumbing and electrical rough in for bathroom. This contractor will be responsible for the restoration of all disturbed areas.
- Q. Snow Removal: This Prime Contractor shall provide all equipment, tools and labor for snow removal to assure work can continue through the winter months. Any accumulation of snow in the areas within the construction fencing and directly outside of the fenced-in area, shall be removed immediately by this Prime Contractor. The contractor will work in-hand with the District with their snow removal efforts to ensure access to the site.
- R. This Prime Contractor will be responsible to provide safe egress between floors, which may include the use of temporary stairs w/handrails; temporary wood treads and railings on metal pan stairs until concrete is poured, ladders, etc. immediately after completion of the structural steel.
- S. This Prime Contractor shall provide fire extinguishers for the life of the project, the extinguishers are to be hung and identified as per OSHA requirements (1 per 3000 sq. ft., or better). These extinguishers are to be re-charged and inspected for the life of the project.
- T. This Prime Contractor shall furnish, install, and maintain an OSHA (3) three-line guardrail system (toe board, 2 mid rails and top rails) @ stairwells, open slab edges, MEP shafts, elevator shafts and other openings leading to fall hazards.
- U. This Prime Contractor shall furnish, install, and maintain perimeter protection at all floors and roof areas of the new building. These safety cables must meet all OSHA requirements. The safety cables must be installed with turnbuckles in such a manner as to allow access to the exterior of the building for completion of work by others.
- V. If due to location of fabrication plant, a local storage yard is required, all cost associated with this storage yard including receiving, unloading, storing, shake-out, reloading, and delivery to the site shall be this Prime Contractors' cost.
 - 1. The Owner may have an Inspector at the plant during the fabrication period. Appropriate access shall be provided at all times for this individual.
- W. Stormwater: This Prime Contractor will NOT be responsible to install stormwater structures and piping associated with the new building. Stormwater and ponding during the period where final connections have yet to be made will be managed by the Prime Contractor for Site Work. Ponding of water within or directly outside the site due to construction activities will be mitigated by the Prime contractor for Site Work, by removing the water by pumping or with re-grading the disturbed area.
- X. Abatement Work: Unless otherwise indicated on the contract documents, this Prime Contractor will be responsible to hire a qualified and DOL licensed Abatement Contractor to perform all the Hazardous Material removals (Asbestos, lead, PCB's) at areas indicated in the existing building as well as new addition tie-ins.
- Y. Demolition Work: This prime contractor is responsible for demolition as indicated on plans with the **exception of the seats. These have been removed by the district.**
- Z. This contractor shall coordinate of all required penetrations through foundation wall with all other contracts. Install pipe sleeves and reinforcement around penetrations.

- AA. This prime contractor is responsible for blocking of bathroom plumbing fixtures and accessories. This prime contractor will provide and install bathroom accessories.
- AB. Unless otherwise noted on the contract documents, this Prime Contractor for General Construction will provide all openings in the new and existing building floors, ceilings, roofs, or walls necessary to accommodate for any new openings required by Mechanical Ductwork greater than 12"x12". This Contractor will patch, repair, and make watertight any openings made by the removal of old work greater than 12"x12".
- AC. Roof Top Mechanical Work- Unless otherwise noted, this Prime Contractor will install all Misc. steel to support new roof top mechanical equipment, as well as cutting the roof opening, providing any blocking required and roof tie-in for all penetrations. The Prime Contractor for Mechanical will provide curbs, location and units.
- AD. Thru wall Mechanical Equipment work- Unless otherwise noted, this prime contractor will provide structural openings for mechanical equipment in the new Construction and/ or modified openings for new equipment in existing buildings, including cutting openings, replacing or modifying brick and block work, lintels, blocking, and final caulking, the Prime Contractor for Mechanical will install the mechanical units and ductwork. Thru wall work must be coordinated with Mechanical Contractor.
- AE. This contractor has reviewed and understands the mechanical and electrical scope of work and has included in the bid plaster patching and painting after all mechanical and electrical equipment has been installed.
- AF. Each Prime Contractor is required to fire stop and/ or smoke stop all walls, floors and ceilings after completion of all their own work regardless of their fire rating.
- AG. Each Prime Contractors' site superintendent and/or competent person to check and ensure all delivered materials conform to approved submittals/shop drawings UPON DELIVERY. Materials delivered incorrectly are the responsibility of the prime contractor and must be rectified by the prime contractor.
- AH. This Prime Contractor will install drywall access doors provided by MEP trades.

PRIME CONTRACTOR FOR MECHANICAL (PCM)

- A. The PCGC shall provide dumpsters for all Prime Contractors. Each Prime Contractor is responsible for collecting, moving, placing, breaking down boxes and pallets, and disposing rubbish, on a daily basis, all debris from their activities into a dumpster supplied by the PCGC. Each Prime Contractor is responsible to broom clean the areas they worked in at the end of each day.
- B. This Prime Contractor for Mechanical should note there are numerous areas where the existing ceilings are remaining. This Contractor will be required to remove and reinstall any ceilings displaced by installation of this Contractor's work. If open ceilings are not replaced within a twenty-four-hour period after a request by the Construction Manager, either verbal or written, the Construction Manager will have said ceilings reinstalled and all related costs will be back charged to said Contractor.
- C. This Prime Contractor shall coordinate with the Electrician, Plumber, and General Construction Prime Contractors to allow all Contractors unabated access to the building.
- D. Unless otherwise noted in the construction documents, this Prime Contractor will cut and cap their own work inside finished walls, floors and ceilings.

- E. This Prime Contractor will temporarily cut, cap, remove and store all radiators for reinstallation after demo, abatement, and finishes.
- F. Each Prime Contractor is required to fire stop and/ or smoke stop all walls, floors and ceilings after completion of all their own work.
- G. This Prime Contractor is responsible for protection of finished work. This Prime Contractor will provide, maintain, and remove the appropriate protection materials necessary to adequately protect his finished product.
- H. This Prime Contractor (PCM) will be responsible for all openings under 12"x12" to complete their work.
- I. Roof Top Mechanical Work- Unless otherwise noted, the **Prime Contractor for General Construction will provide all Misc. steel to support new roof top mechanical units and duct penetrations**, as well as cutting the roof opening, providing any blocking required and roof tie-in for all penetrations. The Prime Contractor for Mechanical will provide curbs and curb location, and units. **This contractor understands that any ductwork to be installed in the attic space that does not fit through the existing building, must be dropped through the newly made penetrations on the roof. New penetrations will NOT be made in existing ceilings for the purpose of hoisting ductwork through. All penetrations on roof must be made water tight by GC.**
- J. Thru wall or floor Mechanical Equipment work- This Prime Contractor must coordinate with the GC to for opening sizes and locations.
- K. This Prime Contractor will provide a flag person, when required, at the entrance gates to coordinate deliveries for their work from the street and protect the public.
- L. Unless otherwise noted in the construction documents, the Prime Contractor for General Construction will repair and patch all existing building walls, floors, and ceilings to match adjacent finishes after the removal of interior partitions, ceilings, floors. Each Prime Contractor will cut and cap and patch their own work inside finished walls, floors and ceilings.
- M. This Prime Contractor for Mechanical will provide two additional sets of filters for all building mechanical units. These filters will be changed out during the 2021/2022 construction.
- N. This Prime Contractor will provide drywall access doors (fire rated if required) for access to duct access doors, valves, fire dampers, etc. GC to install.
- O. Each Prime Contractors' site superintendent and/or competent person to check and ensure all delivered materials conform to approve submittals/shop drawings UPON DELIVERY. Materials delivered incorrectly are the responsibility of the prime contractor and must be rectified by the prime contractor.
- P. **Crane picks for RTU's must be scheduled AFTER HOURS (3:30-8PM or weekends 8AM-5PM)**

PRIME CONTRACTOR FOR ELECTRICAL (PCE)

- A. The Prime Contractor for General Construction (PCGC) shall provide dumpsters for all Prime Contractors. Each Prime Contractor is responsible for collecting, moving, placing, breaking down boxes and pallets, and disposing rubbish, on a daily basis, all debris from their activities into a dumpster supplied by the PCGC. Each Prime Contractor is responsible to broom clean the areas they worked in at the end of each day.

- B. The Prime Contractor for Electrical is to temporarily support existing ceiling mounted equipment/devices (i.e., speakers, fire alarm apparatuses, exit signs, wiring, light fixtures, etc.) as required for demolition of existing ceilings until new equipment/devices are installed or existing equipment/device can be permanently remounted in the new ceiling.
- C. The Prime Contractor for Electrical shall provide and maintain temporary light and power operational throughout the auditorium (normal working hours 7:00 am to 4:00 pm) **including the attic space**. This applies to all scheduled workdays, Monday through Sunday inclusive, which are established as regular workdays for any trade engaged in the work, including such days that are holidays for Electricians but are regular workdays for other trades. These services are to be kept operational until the CM determines that they are no longer required for the execution of the work. Temporary light shall remain on for 24 hours a day and consist of a minimum of (1) bulb and cage per 10 square feet of floor space in all spaces no matter of size throughout the existing building spaces being renovated. Temporary light and power is to be installed as soon as practical, but no later than after the structural steel frame has been erected.
- D. The Prime Contractor for Electrical shall provide temporary power for masonry work, mixers, steel work, welders, fire proofing work, compressors, existing building abatement work, elevator installation, etc. that may require specialized temporary power.
- E. The Prime Contractor for Electrical should note there are numerous areas where the existing ceilings are remaining. This Contractor will be required to remove and reinstall any ceilings displaced by installation of this Contractor's work. If open ceilings are not replaced within a twenty-four-hour period after a request by the Construction Manager, either verbal or written, the Construction Manager will have said ceilings reinstalled and all related costs will be back charged to said Contractor.
- F. The Prime Contractor for Electrical shall clean fixtures and replace all burned out light bulbs when building is turned over to the owner at substantial completion.
- G. This Prime Contractor shall coordinate with the, General Contractor, Plumber, and Mechanical Prime Contractors to allow all Contractors unabated access to the building.
- H. Unless otherwise noted in the construction documents, this Prime Contractor will cut and cap their own work inside existing finished walls, floors and ceilings.
- I. Each Prime Contractor is required to fire stop and/ or smoke stop all walls, floors and ceilings after completion of all their own work.
- J. This Prime Contractor is responsible for protection of finished work. This Prime Contractor will provide, maintain, and remove the appropriate protection materials necessary to adequately protect his finished product.
- K. This Prime Contractor is to develop a separate site-specific electrical service shutdown/upgrade schedule within four weeks after Notice to Proceed. This schedule will be developed in conjunction with the Construction Manager and the Owner. No shutdown/transfer will be permitted at any time without prior written notification. The Prime Contractor for Electrical shall provide temporary power for all 'others' work ongoing at the site during any electrical shutdown or transfer period that would otherwise deny other Contractors power. No shutdown or transfer shall be allowed during active school hours. Any and all shutdowns must be scheduled on the Owners off days (weekends, holidays). Any shutdown longer than three days will require this Prime Contractor to supply temporary power for the Owner (i.e., generators). The Electrical Prime Contractor shall provide a minimum of forty-eight hours' notice to the Owner and the Construction Manager or any necessary power shutdown.

- L. Fire Alarm System: This Prime Contractor will provide and install new fire alarm devices and all necessary equipment to make a proper connection to existing fire alarm control panel up to and including new door holders, elevator recall relays and shutter door modules/relays.
- M. This Prime Contractor will be responsible for all floor, wall, and roof openings to properly install the work, including saw cutting, core-drilling and alike.
- N. The Prime Contractor for Electrical shall remove, replace, or patch any asphalt or concrete pavements and surface finishes outside the area of work defined in the contract documents, and required to install their work.
- O. This Prime Contractor will provide a flag person, when required, at the entrance gates to coordinate deliveries for their work from the street and protect the public.
- P. This Prime Contractor will provide drywall access doors if required and GC to install.
- Q. Unless otherwise noted in the construction documents, the Prime Contractor for General Construction will repair and patch all existing building walls, floors, and ceilings to match adjacent finishes after the removal of interior partitions, ceilings, floors. Each Prime Contractor will cut and cap and patch their own work inside finished walls, floors and ceilings.
- R. Each Prime Contractors' site superintendent and/or competent person to check and ensure all delivered materials conform to approve submittals/shop drawings UPON DELIVERY. Materials delivered incorrectly are the responsibility of the prime contractor and must be rectified by the prime contractor.
- S. **This Prime Contractor understands that they will be running 2 separate conduits from the switchgear through 4 separate floors of the building to serve the new RTU's on the roof. This work must be performed after hours. All patchwork related to this work is the responsibility of this prime contractor.**

END OF SECTION

Auditorium Renovations at Farragut Middle School

8/5

3/1

Bid Phase

8/5

9/13

Bid Documents Available 8/5

Anticipated Pre-Bid Walkthrough 8/18

Anticipated Bid Opening 9/3

Anticipated Contract Award 9/13

9/14

Construction

2/15

Mobilization/Submittals

Auditorium Renovations

Close Out
2/15 3/1

Substantial Completion 2/15

Punch List/Close Out

Final Completion 3/1

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# 2021004562PRC# 2021004562

<https://apps.labor.ny.gov/wpp/publicViewProject.do?method=showIt&id=1513482>

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

**Hastings-On-Hudson Union Free School District
Board of Education
27 Farragut Ave
Hastings-on-Hudson, NY 10706**

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.



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							(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS						(9) NET WAGES PAID FOR WEEK		
				HOURS WORKED EACH DAY																		
			O																			
			S																			
			O																			
			S																			
			O																			
			S																			
			O																			
			S																			
			O																			
			S																			
			O																			
			S																			
			O																			
			S																			

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

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)
_____ ; that during the payroll period commencing on the _____
(Building or Work)
_____ 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.

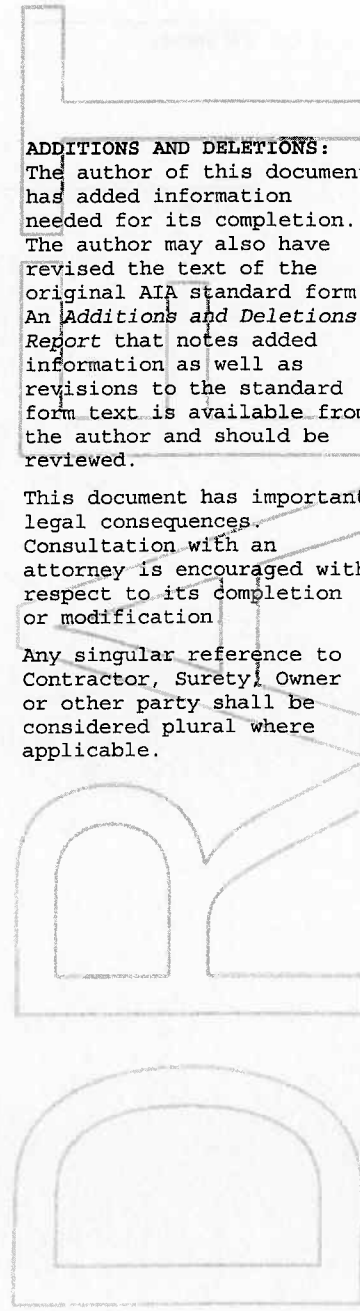
When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement 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.



ELECTRONIC COPYING of any portion of this AIA Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

Signed and sealed this « » day of « », « »

(Witness)

(Witness)

« »

(Contractor as Principal)

(Seal)

« »

(Title)

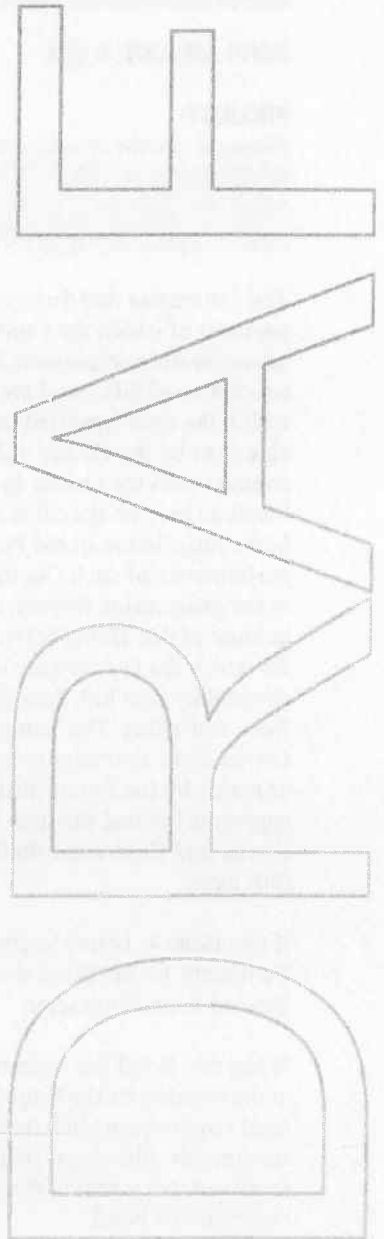
« »

(Surety)

(Seal)

« »

(Title)



DRAFT 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

Company: (Corporate Seal)

SURETY

Company: (Corporate Seal)

Signature:

Name and « »

Title:

(Any additional signatures appear on the last page of this Performance Bond.)

Signature:

Name and « »

Title:

(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.

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.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

§ 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.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- .1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- .2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
- .3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company:

(Corporate Seal)

SURETY

Company:

(Corporate Seal)

Signature:

Name and Title:

« »« »

Address:

« »

Signature:

Name and Title:

« »« »

Address:

« »

DRAFT AIA Document A312™ - 2010

Payment Bond

CONTRACTOR:

(Name, legal status and address)

« »
« »

SURETY:

(Name, legal status and principal place of business)

« »
« »

OWNER:

(Name, legal status and address)

« »
« »

CONSTRUCTION CONTRACT

Date: « »

Amount: \$ « »

Description:

(Name and location)

«PWA»

« »

BOND

Date:

(Not earlier than Construction Contract Date)

« »

Amount: \$ « »

Modifications to this Bond:

« »

None

« »

See Section 18

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

SURETY

Company: (Corporate Seal)

Signature:

Name and « »

Title:

Signature:

Name and « »

Title:

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

« »
« »
« »

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

« »
« »
« »
« »
« »
« »

ADDITIONS AND DELETIONS:

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

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.

ELECTRONIC COPYING of any portion of this AIA Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- .1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- .2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: _____ (Corporate Seal)

Signature: _____

Name and Title: « »« »

Address: « »

SURETY

Company: _____ (Corporate Seal)

Signature: _____

Name and Title: « »« »

Address: « »

Application and Certificate for Payment, Construction Manager as Adviser Edition

TO OWNER: PROJECT: Ossining Union Free School District APPLICATION NO: 001 DISTRIBUTION TO: OWNER

FROM CONSTRUCTION MANAGER: PERIOD TO: CONSTRUCTION MANAGER

CONTRACTOR: CONTRACT DATE: ARCHITECT

PROJECT NOS: / / CONTRACTOR

VIA ARCHITECT: FIELD

CONTRACT FOR: General Construction

CONTRACTOR'S APPLICATION FOR PAYMENT

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:

1. ORIGINAL CONTRACT SUM \$0.00

2. NET CHANGES IN THE WORK \$0.00

3. CONTRACT SUM TO DATE (Line 1 ± 2) \$0.00

4. TOTAL COMPLETED AND STORED TO DATE (Column G on G703) \$0.00

5. RETAINAGE:

a. 0 % of Completed Work (Column D + E on G703) = \$0.00

b. 0 % of Stored Material (Column F on G703) = \$0.00

Total Retainage (Lines 5a + 5b, or Total in Column I on G703) \$0.00

6. TOTAL EARNED LESS RETAINAGE \$0.00

(Line 4 minus Line 5 Total)

7. LESS PREVIOUS CERTIFICATES FOR PAYMENT \$0.00

(Line 6 from prior Certificate)

8. CURRENT PAYMENT DUE \$0.00

9. BALANCE TO FINISH, INCLUDING RETAINAGE \$0.00

(Line 3 minus Line 6)

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.)

CONSTRUCTION MANAGER:

By: Date:

ARCHITECT: (NOTE: If Multiple Prime Contractors are responsible for performing portions of the Project, the Architect's Certification is not required.)

By: Date:

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

SUMMARY OF CHANGES IN THE WORK	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$0.00	\$0.00
Total approved this month including Construction Change Directives	\$0.00	\$0.00
TOTALS	\$0.00	\$0.00
NET CHANGES IN THE WORK		\$0.00

DRAFT AIA Document G704™ - 2000

Certificate of Substantial Completion

PROJECT:
(Name and address)
PWA

PROJECT NUMBER: /
CONTRACT FOR: General Construction
CONTRACT DATE:

TO OWNER:
(Name and address)

TO CONTRACTOR:
(Name and address)

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER: ☐

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.)

DRAFT AIA Document G706™ - 1994

Contractor's Affidavit of Payment of Debts and Claims

PROJECT: (Name and address)
PWA

ARCHITECT'S PROJECT NUMBER:

TO OWNER: (Name and address)

CONTRACT FOR: General Construction

CONTRACT DATED:

OWNER: ☐

ARCHITECT: ☐

CONTRACTOR: ☐

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:

DRAFT

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:

DRAFT AIA Document G707™ - 1994

Consent Of Surety to Final Payment

PROJECT: *(Name and address)*

PWA

ARCHITECT'S PROJECT NUMBER:

CONTRACT FOR: General Construction

TO OWNER: *(Name and address)*

CONTRACT DATED:

OWNER: ☐

ARCHITECT: ☐

CONTRACTOR: ☐

SURETY: ☐

OTHER: ☐

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

on bond of

(Insert name and address of Contractor)

, SURETY,

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)

, CONTRACTOR,

, 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)

PART 1 - GENERAL

1.01 BRIEF PURPOSE OF PROJECT / GENERAL

- A. The purpose of this project is to accomplish the Renovations to the Farragut Middle School/High School Project consisting of a full renovation of the auditorium on the 4th floor of the building. The work consists of, but is not limited to; spot demolition, coordinating the schedule and installation of new seating, construction of new accessible seating platforms, strip, sand, stain and patch existing hardwood floor, crack and plaster wall repairs, new stairs to stage, blocking for new a/v equipment, alcove for new projector, new stop height at existing elevator, new air conditioning system, new Toilet Room (add/alt), new a/v equipment (add/alt) and production lighting (add/alt).
- B. All work shown and specified in the Contract Documents shall be the work of this Construction Contract. The Owner does not anticipate awarding other prime contracts for the project as shown.
- C. This Section provides an abbreviated summary of the work for the Construction Contracts associated with the Owner's program to construct the project.
- D. Each Contractor has been provided with copies of all relevant construction drawings for related construction contracts whose work may directly effect and impact the work under this Contract.
 - 1. Each Contractor shall provide a complete and operational project in anticipation of these affects and impacts.
 - 2. It is each Contractor's responsibility to investigate the work that will be performed by others and consider such in the conduct of his/her work.
- E. 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. The terms "Contractor" and/or "Prime Contractor" where used within the body of a specific Construction Contract, (i.e.; Contract G, Contract M, and Contract E), shall refer to the individual or company who has entered into an agreement with the Owner to perform the work contained within those Contract Documents. The lack of word capitalization shall be incidental.
- C. The General Construction Contractor may be referred to as the "General Contractor", "Prime General Contractor", "Contract G Contractor" or similar wording. The lack of word capitalization shall be incidental. This Construction Contract shall be known as Contract G.
- D. The Electrical Construction Contractor may be referred to as the "Electrical Contractor", "Prime Electrical Contractor", "Contract E Contractor" or similar wording. The lack of word capitalization shall be incidental. This Construction Contract shall be known as Contract E.
- E. The Heating, Ventilating & Air Conditioning Construction Contractor may be referred to as the "HVAC Contractor", "Prime HVAC Contractor", "Contract M Contractor" or similar wording. The lack of word capitalization shall be incidental. This Construction Contract shall be known as Contract M.

- F. 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.

1.03 ABBREVIATED SUMMARY OF CONTRACT G 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.
- B. This following abbreviated summary is provided in order to briefly describe the work covered by the Contract Documents for this Construction Contract. It is not all inclusive of the work under the Contract.
- C. The work includes, but is not limited to, provision and installation of the following:
1. All staging, safety and Temporary facility requirements
 2. Asbestos abatement as indicated in the Contract Documents.
 3. Structural modifications.
 4. Refinish select flooring
 5. New mud setting bed pitched to Toilet Room floor drain.
 6. Tile flooring and walls
 7. Provide new guardrails and ladder.
 8. Replace and repair select ceilings
 9. Provide plumbing chase access for new Toilet Room, patch and repair areas to match existing conditions once work is complete.
 10. Demolish, replace and repair select walls as indicated on the drawings.
 11. Provide and install custom shaped radiator covers as indicated on the drawings.
 12. Install and trim HVAC grilles provided by Contract 'M'.
 13. Remove and infill Auditorium window.
 14. Coordinate elevator work with elevator manufacturer.
 15. Coordinate AV equipment installations with AV Vendor
 16. Coordinate Auditorium seating & stage equipment installations by District Vendors.
 17. Rough framing
 18. Provide blocking for new equipment, stairs, trim, and cabinetry
 19. Finish carpentry
 20. Control booth walls and desktop with associated wood trim.
 21. Prime and paint or stain renovated areas as selected by the District.
 22. Doors and hardware
 23. Flashing of roof penetrations and accesories installed by Contract 'M' and Contract 'E' at the roof level.
 24. Performance of all roof work under this contract by an authorized roofing contractor certified to maintain the existing Roofing Warranty held by the District.
 25. Signage
 26. Toilet Room accessories as indicated on the Contract Documents.
 27. Saw cut exterior wall HVAC penetrations and install louver provided by Contract 'M' for the Toilet Room.
 28. Provide roof penetration flashing of Toilet Room vent stack (add alternate).
 29. Extend supply lines to new Toilet Room fixtures (add alternate)
 30. Install new floor drain and waste line tied into existing piping system (add alternate).
 31. Provide roof vent (add alternate).
 32. Provide and install Toilet Room fixtures (toilet and sink) (add alternate)
 33. Provide and install new floor drain (add alternate)

34. All Contracts: Startup participation for the various equipment and systems of the project. Provide complete services to troubleshoot and assist manufacturer service representatives in obtaining a completely functional installation. Provide systems and equipment training for Owner personnel.
35. Project closeout submittals.

D. All other work shown and specified within the Contract Documents for Contract G.

1.04 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.
- B. This following abbreviated summary is provided in order to briefly describe the work covered by the Contract Documents for this Construction Contract. It is not all inclusive of the work under the Contract.
- C. The work includes, but is not limited to, the following:
 1. Arrange for and install primary electric service.
 2. Motor control centers, local control stations, transfer switches, power distribution panels, breakers, lights, and switches.
 3. Electrical connections (final termination) to all equipment, control panels, ventilating equipment and electrical devices.
 4. Removal of existing components as noted.
 5. New lighting fixtures, wiring and associated equipment.
 6. Wiring connections to all electrical equipment (including equipment furnished by others).
 7. Testing, programming and adjusting of all electrical systems.
 8. Startup participation for the various equipment and systems of the project. Provide complete service to troubleshoot and assist manufacturer service representatives in obtaining a completely functional installation. Provide systems and equipment training for Owner personnel.
 9. Provide electrical connections at first four rows of seating.
 10. Project closeout submittals.
- D. All other work shown and specified in the Contract Documents for Contract E.

1.05 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.
- B. This following abbreviated summary is provided in order to briefly describe the work covered by the Contract Documents for this Construction Contract. It is not all inclusive of the work under the Contract.
- C. The work includes, but is not limited to, the following:
 1. New roof top units
 2. New roof top and attic duct work
 3. Provide HVAC grilles for to Contract 'G' to install
 4. New Toilet Room heat and ventilation (add alternate)

5. Startup participation for the various equipment and systems of the project and provide complete service to troubleshoot and assist manufacturer service representatives in obtaining a completely functional installation.
6. Testing and balancing of systems.
7. Project closeout submittals.

D. All other work shown and specified in the Contract Documents for Contract M.

1.06 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. Local laws and ordinances of Westchester County and New York State.
 2. 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.

1.07 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. Coordination with the Owner and other contractors who have been awarded work by the Owner.
 3. Site utilization and management so as not to disrupt the Owner's ability to operate the existing facilities in a safe and efficient manner.
 4. Maintain the Owner's ability to operate the facility at all times during the construction period.
 5. Facilities to be used during the contract period that are to be used by the Owner or his representatives and others involved with constructing the project.
 6. Product and equipment storage and handling requirements.
 7. Starting and adjusting of the equipment and systems required under the project.
 8. Site safety in accordance with all applicable federal, state, and local regulations.
 9. Project submittals, meeting/testing services/work plans/schedule/shop drawings/closeout procedures and documents/manuals/as-built drawings of the work shall be provided as required by the Contract.
- B. Each Contractor shall coordinate the work between the various construction contracts, through the Owner/Architect/Engineer, as required to complete the contract requirements in accordance with the requirements contained in Section 013100.

1.08 OWNER SUPPLIED PRODUCTS AND UTILITIES

- A. The Owner will not be supplying equipment, labor, or tools for the project.
- B. The Owner will be supplying products or materials for the project as follows:
1. Products shown on the Drawings or specified elsewhere.
- C. The Owner will pay for electricity usage. The restrictions on electrical usage shall be as follows:
1. Power tool usage during specified working hours will only be permitted.
 2. Dewatering and trash pumps and portable heaters will not be permitted.
 3. Power to the Owner/Architect/Engineer's trailer, if applicable.
 4. Power to help cure concrete or painting systems will not be permitted.

- D. The Owner reserves the right to stop paying for electrical usage at any time if, in the opinion of the Owner/Architect/Engineer, the Contractor causes excessive electrical charges or does not conserve electricity to the maximum extent possible in the opinion of the Architect/Engineer. All Contractors shall conserve electricity during the course of construction.

1.09 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. 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 Contractors 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.
- I. The Contractors shall not close any road for any period in time unless approved ahead of time by appropriate road agency. The Contractors shall take whatever measures are necessary to not cause any inconvenience to the area's residents.

- J. The 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.
- K. Contractors shall be responsible for protecting private 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 the Architect/Engineer or District. Contractors shall protect all of the physical structures, property and improvements from damage by their Work and shall immediately repair or replace damage caused by construction operations, employees or equipment employed by the Contractors. All labor, materials and equipment and outside contractors that are employed by the Owner to repair damage caused by the Contractors shall be billed to the Contractors directly or withheld from money due the Contractors for work already completed.
- L. Keep all existing driveways, roads, and parking areas free and clear of materials and equipment. Do not unreasonably encumber the work area with materials and equipment.
- M. The Contractors are responsible for cleaning up the work area. Failure to maintain a clean work site daily, will result in others performing the work and the Contractor being back charged for the cleaning cost plus construction administration fees.
- N. Do not discard or dispose of any waste on-site.
- O. The Contractors shall be responsible for managing dust.

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 utility companies to install their work.
 - 5. To allow for the delivery of equipment and materials by independent trucking companies by leaving enough space for backing in and out of areas.
 - 6. 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 provide temporary handrails, as required, for their work or for work put in place by their Contract that will require temporary handrails. Construction of temporary handrails shall be as specified in Section 015000.

- E. 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.
- F. 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.
- 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. 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.
- I. 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.
- J. 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.
- K. Do not discard or dispose of any waste on-site.
- L. Open fires will not be permitted on 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.
- 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. Employees shall not converse with local residents or Owner's employees.
- E. Any employee found under the influence of any drug or alcohol will be banned from the site.
- F. 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.

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. The General 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, Owner's Construction Representative, and other Prime Contractors. 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 General Contractor in developing the criteria for the plan. During these meetings, all parties will present their needs and requirements for site utilization. As a minimum, each Prime Contractor shall be allocated the same amount of staging/parking/material storage area regardless of the dollar amount of their construction contract. 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. The General 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 General Contractor fails to prepare the Site Utilization Plan as stipulated above, then the Owner reserves the right to back charge the General 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

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Allowance pricing for the following items:
 - 1. General 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 GENERAL 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 DESCRIPTION

- A. This Section specifies the requirements for measurements and records made for payment purposes and describes the item(s) under which payment(s) will be made for the Work performed under this Contract.
- B. All work shown or specified in the Contract Documents shall be performed.
- C. Items not specified to be measured or paid for (for which no specific pay item exists in the Price Schedule) shall be included in an appropriate unit price item or in a lump-sum item.
- D. Comply with the requirements pertaining to the restoration of all surfaces, which may or may not be paid for under a separate unit price item, and which shall be restored to a condition equal to or better than that existed prior to work starting under this contract.

1.02 MEASUREMENT REQUIREMENTS

- A. All required measurements shall be made by the Contractor with the Architect/Engineer.
- B. Any measurements not witnessed by Architect/Engineer and which cannot be verified or substantiated by Architect/Engineer will not be approved and payment under the item(s) requiring such measurements will not be made.
- C. Coordinate measurements monthly, for the preparation of periodic pay estimates.
- D. Where payments will be made for removing rock and existing materials, notify Architect/Engineer so that he may witness the measurements.
 - 1. All materials removed without conforming to the above procedures, which Architect/Engineer cannot verify or substantiate, will not be paid for.
 - 2. Maintain complete, neat, clean, and legible field notes for all measured items.
 - 3. Notes shall contain spaces for Contractor's and Architect/Engineer's signatures plus additional space for comments.
 - 4. An original and a carbon copy shall be made for all notes and one copy shall be turned over to Architect/Engineer daily.
 - 5. The Architect/Engineer's signature shall not be constituted as an acceptance of the work, or the measurements made, but shall mean that he was present when the measurements were made.

1.03 SUBMITTALS

- A. Field notes of all measurements for payment purposes delivered to Architect/Engineer daily.
- B. Copies of all invoices required for payments out of cash allowance(s).
- C. Monthly Applications for Payment.
- D. Record Drawings showing the locations and quantities of all items measured for payment purposes.

1.04 SCHEDULING

- A. Notify Architect/Engineer, as far in advance as possible, of the recording of measurements so that a representative of the Architect/Engineer may observe existing conditions, work being performed, and measurements being made.

- B. Allow for and afford Architect/Engineer ample time, space, and equipment to observe measurements and to verify measurements and elevations.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide all labor, materials, facilities, levels, measuring devices and all other equipment and items necessary to properly and accurately perform all measurements for payment purposes.
- B. Payment for certain items not specifically listed in the bid forms but otherwise required by the technical specifications shall be deemed included as part of the General Conditions and the individual unit price and lump sum bid items provided for in the proposal.

PART 3 - EXECUTION

3.01 GENERAL

- A. Perform all measuring required under this Section.
- B. Record all measurements and calculated quantities on the Record Drawings.
- C. No measurement shall be made for work performed within the limits of Lump Sum Items.

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. Only products not specifically named in the bid are eligible for substitution in accordance with the requirements contained herein these specifications.
- D. 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 named in the bid.

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. Shall reimburse the Owner for review or redesign services associated with re-approval by authorities, if required.
 - 6. Shall 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.

- 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: Auditorium Renovations to Farragut Substitution Request Number: _____
Middle School

Contractor: _____

Address: _____

To: _____ Date: _____

H2M Project Number: HHSD1905 Owner: Hastings-On-Hudson 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 SUMMARY

- A. The work under this Section of the Specification shall consist of the establishment of the Contractor's general plant, including shops, storage area, equipment, office and such sanitary and other facilities as are required by local or state law and all other work performed or costs incurred before beginning Work.

1.02 MATERIALS AND INSTALLATION

- A. Such materials as are required for mobilization and that are not to be a part of the complete Contract shall be as determined by the Contractor, except that they shall conform to any pertinent local or state law, regulation or code.
- B. The work required to provide the above facilities and services for mobilization shall be done in a safe and workmanlike manner and shall conform with any pertinent local or state law, regulation or code. Good housekeeping consistent with safety shall be maintained.

1.03 MEASUREMENT AND PAYMENT

- A. The amount to be paid for mobilization in the monthly pay estimate is limited to the following maximum amounts:
1. Original Contract Amount (Including Mobilization)

FROM MORE THAN (\$)	UP TO AND INCLUDING (\$)	MAXIMUM AMOUNT FOR MOBILIZATION (\$)
0	100,000	3,000
100,000	500,000	15,000
500,000	1,000,000	30,000
1,000,000	2,000,000	60,000
2,000,000	3,000,000	90,000
3,000,000	4,000,000	120,000
4,000,000	5,000,000	125,000
5,000,000	6,000,000	150,000
6,000,000	7,000,000	175,000
7,000,000	10,000,000	200,000
10,000,000	-	2.5% OF AMOUNT BID

- B. The amount for mobilization shall be payable to the Contractor whenever he completes ten (10%) percent of the work of the Contract. For the purposes of this Item, 10% of the work shall be considered completed when the total of payments earned and paid, as reflected by estimates of work done, not including the amount bid for this Item or for materials and equipment suitably stored, shall exceed 10% of the total amount bid for this Contract.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

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 Architect 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 Architect 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 Architect. 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 Progress 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. Schedule of Values

1.02 SCHEDULE OF VALUES

- A. Submit for approval prior to the start of the work a Schedule of Values that indicates a breakdown of the labor, materials and equipment and other costs used in the preparation of the bid. This schedule shall be in sufficient detail to indicate separate figures for such items as excavation, concrete, equipment and all other items making up the lump sum price. The cost breakdown shall be separately itemized for each lump sum bid item in the project.
- B. Where the cost breakdown includes items for bond payment, insurance payment, job set-up, or job mobilization, these items will be paid based on paid invoices and copies of cancelled checks.
- C. Submit a Schedule of Values to the Architect/Engineer for review and approval within fifteen (15) calendar days from the date shown on the Notice to Proceed.

1.03 FORM OF SUBMITTAL

- A. Submit typewritten Contract Cost Breakdown on AIA Form G703 - Application and Certificate for Payment Continuation Sheet or EJCDC 1910-8-E. The Architect/Engineer reserves the right to revise the form or provide a form prepared by the Architect/Engineer.
- B. Use the Table of Contents of the Contract Specifications as a basis for format for listing costs of work for Sections under Divisions 01-48 as sections apply to work. Not all Sections need be assigned a breakout price as determined by the Architect/Engineer.
- C. Identify each line item with number and title as listed in Table of Contents.
- D. Provide dollar values for each line item for labor, overhead, profit, material, and equipment components for each category of work if requested by the Architect/Engineer.
- E. List quantities of materials specified under unit price allowances.
- F. The Schedule of Values, after approval by the Architect/Engineer, shall be the basis for the Contractor's Application for Payment.
- G. The first Application for Payment will not be reviewed prior to an approved breakdown.

1.04 PREPARATION OF SCHEDULE OF VALUES

- A. In addition to the above, provide a separate line item cost for each of the following items which shall be supported by proof where requested by Architect/Engineer:
 - 1. Performance and payment bonds.
 - 2. Insurance.
 - 3. Mobilization and Demobilization (Amounts shall be equal in value).
 - 4. Temporary facilities and measures as specified in Section 015000.
 - 5. Project Coordination Meetings as specified in Section 013100.
 - 6. Preparation of the Project Construction Schedule, and updates, as specified in Section 013300.
 - 7. Preparation of Weekly Schedules as specified in Section 013100

8. Rubbish removal and daily cleaning up. (Provide a total dollar amount and a daily rate for each calendar day during the contract period.)
 9. All Cash Allowance items as contained in Section 012100.
 10. On-site, full time superintendent starting on the date of the Notice To Proceed and ending on the date that all punch list items are completed, which for the purposes of the Schedule of Values, shall be the contract completion date.
 11. Final cleaning.
- B. Show total costs including overhead and profit.
- C. Provide additional details and data to substantiate the cost breakdown as 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. Work of this Section includes:
 - 1. Requests for Interpretation or for information
 - 2. Administration of subcontracts
 - 3. Communication and coordination requirements
 - 4. Qualifications of Contractor's job site superintendent
- 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 Construction Manager 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 COORDINATION BETWEEN CONTRACTORS

- A. Each Contractor shall fully cooperate with each other Contractor(s) and carefully fit its own work to that provided under other contracts as shown or specified in the Contract Documents and as may be coordinated by the Owner and as may be coordinated by the Owner/Architect
- B. Each Contractor shall not commit or permit any act that will interfere with the timely performance of work by any other Contractor.
- C. The Contractor shall conduct his/her own operations, and to cooperate with such other parties, so as to cause as little interference as possible with the work by others.
- D. The Contractor agrees to make no claim against the Owner/Architect/Engineer for additional payment due to delays or other conditions created by the operation of others.
- E. If there is a difference of opinion as to the respective project rights of each Contractor doing the work, within the limits of or adjacent to the Project, the Owner/Architect/Engineer shall decide as to the respective rights of the various parties involved in order to secure completion of the work in a satisfactory manner. The Owner/Architect/Engineer's decision shall be final and binding on each Contractor.
- F. If any portion of the work of the Contractor, or any of his/her subcontractors, depends upon the proper execution of the work by others, the Contractor shall promptly give written notice to the Architect/Engineer of all purported defects in the installed work as renders it unsuitable for proper execution and completion of his own work. The Contractor shall further notify the Architect/Engineer of all supposed delays, in the performance of his/her work, as will affect the timely performance of his own work or the project.
- G. The Contractor's lack of notice shall also constitute an acceptance by him/her and an acknowledgement of the timely performance of work by other Contractors or the Owner and that no claims for additional compensation may result.
- H. If the Owner/Architect/Engineer determines that the Contractor is failing to coordinate his own work with the work of others, then the Owner shall have the right to enforce the provisions of the Contract as related to non-performance.
- I. The Owner/Architect/Engineer shall not be liable for any damages suffered by this Contractor by reason of any other Contractor's failure to comply with the directions so issued by the Owner/Architect/Engineer, or by reason of another Contractor's default in performance; it being understood that the Owner does not guarantee the continued efficiency or work production of any Contractor and by execution of the Contract, the Contractor fully understood the potential coordination problems associated with projects involving multiple prime construction contracts.
- J. The Contractor's attention is specifically directed to the fact that he may not have exclusive occupancy of the work area within the limits of the Contract. Each Contractor shall afford the Owner, other Contractors, and utilities reasonable opportunity for the storage of their materials and equipment, and the execution of their work, and shall connect and coordinate his work with theirs as required by the Contract Documents.

1.05 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.

1.06 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.

1.07 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.

1.08 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.

THIS SPACE LEFT INTENTIONALLY BLANK.

REQUEST FOR INTERPRETATION/INFORMATION (RFI)

OWNER'S NAME: Hastings-On-Hudson Union Free School District

PROJECT NAME & CONTRACT DESIGNATION: Auditorium Renovations to Farragut Middle School

CONSTRUCTION CONTRACT NO.: HHSD1905

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	<i>Response Accepted By Contractor</i> <i>Contractor's Signature & Date</i>	
<p>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.</p>		

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:
 - 2. Tentative construction schedule.
 - 3. Critical work sequencing.
 - 4. Designation of responsible personnel.
 - 5. Procedures for processing field decisions and Change Orders.
 - 6. Procedures for processing Applications for Payment.
 - 7. Distribution of Contract Documents.
 - 8. Submittal of Shop Drawings, Product Data, and Samples.
 - 9. Preparation of record documents.
 - 10. Use of the premises.
 - 11. Parking availability.
 - 12. Office, work, and storage areas
 - 13. Equipment deliveries and priorities.
 - 14. Safety procedures.
 - 15. First aid.
 - 16. Security.
 - 17. Housekeeping.
 - 18. 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.
- D. Each Contractor is required to attend the pre-construction conference at a location, date, and time selected by the Owner.

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. 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 weekly) 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. Progress meetings will be held approximately once every two (2) weeks during the project. The Owner may elect to hold meetings more or less frequently.
- F. 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.
- G. 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.
- H. 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.
- I. Subcontractors shall attend when requested by the Owner or Owner's Construction Representative at no cost to the Owner.
- J. Meetings will be conducted by Owner's Construction Representative at a location selected by the Owner, normally at or adjacent to the project site.
- K. 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.

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 OTHER MEETINGS

- A. Attend special meetings which may be required or called for by Federal, State or Local authorities, utility companies, Owner, Architect/Engineer or any other firm, person or organization related to the project.

1.08 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.
- B. Prepare a Gantt Chart type schedule and keep it up to date as specified hereinafter.
- C. All schedules shall be submitted in accordance with the requirements contained herein in Section 013300.
- D. Refer to Section 013100 regarding the requirements for attendance at Project Coordination Meetings and additional requirements concerning the submission of other project coordination and sequencing information.

1.02 CONSTRUCTION SCHEDULE - GENERAL

- A. The Contractor shall develop a full schedule, in sufficient detail and clarity of forand 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 CONSTRUCTION SCHEDULE - GANTT CHART TYPE

- A. The schedule shall 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.
- B. Prepare the schedule in a manner so that the actual progress of the work can be recorded and compared with the expected progress.
- C. The schedule shall show the following:
 - 1. Task links/task dependency in blue ink.
 - 2. Work under the Contract in green ink.
 - 3. Milestone dates (zero duration) by a red diamond.
 - 4. The end date for each task and subtask at the end of a bar.
 - 5. The description of all major tasks within the bar. The bar shall be red.
 - 6. Critical path.

1.04 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.

1.05 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).

1.06 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.

1.07 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.

1.08 REVISION OF PROJECT PROGRESS SCHEDULE

- A. Each Prime 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. Each 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.

1.09 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.

1.10 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 completed 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, followed by a period, 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. Loading Dock Elevator and Equipment Shop Drawings.
 - b. Boiler and Equipment Package.
 - c. Tapered Shop Drawings.
 - d. Roofing Package (membrane, vapor barrier, adhesive, etc.).
 - e. Masonry Samples.
 - f. Asbestos Abatement Submittals & Plan.
 - g. Finish Flooring Samples.
 - h. And all other submittals critical to the schedule.
 - 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. On projects with a Construction Manager, submissions shall be pre-approved by the Construction Manager. 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
 - Address, City, State Zip

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 - PROPOSAL (PA) 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 incorporated 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. Submit one (1) electronic copy of each standard drawing, catalog cut, or other material. All shop drawings or submittals that are not in the standard 8-1/2" x 11" format shall be submitted electronically and in paper. Samples shall be delivered directly to the office of the Architect/Engineer. The Architect/Engineer will return an electronic copy of each submittal once reviewed.

- C. 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.
- D. 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.
- E. The Contractor shall make all measurements, confirm existing conditions, and include them on the shop drawings before making a submission to the Architect/Engineer.
- F. Submissions for a single item, or group of related items shall be complete.
- G. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
- H. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
- I. When submitting manufacturers' catalogs, pamphlets or other data sheets, in lieu of prepared shop drawings, clearly mark the items being submitted for review.
- J. 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.
- K. 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.
- L. 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. All 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 in 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

THIS SPACE LEFT INTENTIONALLY BLANK

CONTRACTOR'S COMPANY NAME
ADDRESS

SUBMISSION TRANSMITTAL FORM

CLIENT NAME: Hastings-On-Hudson Union Free School District
PROJECT TITLE: Auditorium Renovations to Farragut Middle School

H2M PROJECT NO.: HHSD1905

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:	<i>Name</i>	() <i>Tel. no.</i>	<i>Email</i>
Supplier's Name:			
Supplier's Mailing Address:			
Supplier's Contact Information:	<i>Name</i>	() <i>Tel. no.</i>	<i>Email</i>
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.
- D. Elevator Work; conform to:
 - 1. American National Standard Safety Code for Elevators, Dumbwaiters, and Escalators as approved by American Standards Association, referred to herein as ANSI Code.
 - 2. Industrial Code Bulletin No. 8 as adopted by the State Industrial Board, State of New York, Department of Labor, Board of Standards and Appeals. Submission of plans and specifications, and request for elevator tests to the Department of Labor and the issuance of a certificate of approval from the Department of Labor will not be required.
 - 3. In event of conflict between American National Safety Code and New York State Code Bulletin 8, the more rigid requirements shall apply as interpreted by the State.

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. State Plumbing Code
 - 8. New York State Energy Code
 - 9. County Department of Health
 - 10. Town Codes, Rules, Laws and Ordinances
 - 11. Sewer District Sewer Use Code
 - 12. Local Water District
 - 13. Electric Utility
 - 14. Gas Utility
 - 15. 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. Such permits include, but are not limited to:
 - 1. Transportation and disposal of construction debris
 - 2. Building permits that are required by the municipality where the work is located. Arrange for inspections of the work by the municipal building department before closing in the installed work, if so required. Work will not be accepted for payment until such inspections are performed and accepted by the building department.

1.05 NOISE CONTROL

- A. Control noise in accordance with City and OSHA requirements.

1.06 PERFORMANCE BONDS

- A. The Contractor shall obtain, pay for and submit all bonds required in connection with the work.

1.07 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.

1.08 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

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Requirements for monitoring the quality of the constructed project.
- B. Work of this Section also includes services of an independent testing laboratory for quality assurance testing.

1.02 REFERENCES

- A. ASTM C1077 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- B. ASTM D4561 - Practice for Quality Control Systems for an Inspection and Testing Agency for Bituminous Paving Materials.
- C. ASTM E699 - Practice for Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E6.

1.03 QUALITY ASSURANCE - CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards of workmanship that is more precise.
- C. Perform work by persons qualified to produce workmanship of specified quality.
- D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.
- E. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

1.04 MOCK-UP

- A. Tests will be performed under provisions identified in this Section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashing, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining work.
- D. Where a mock-up has been accepted by the Architect/Engineer and is specified to be removed, then the Contractor shall remove the mock-up and clear the area when directed to do so by the Architect/Engineer.

1.05 QUALITY ASSURANCE - TESTING LABORATORY

- A. In order to establish compliance with the Contract Documents, materials shall be tested, examined and evaluated before they are incorporated into the work. During and after

installations, additional tests, examinations, and evaluations shall be made to determine continued compliance throughout the course of the work.

- B. Testing laboratory shall be a reputable, experienced firm that is capable of performing all of the required testing and authorized to operate in the state in which the project is located.
- C. Perform all sampling and testing in accordance with specified procedures and use the materials, instruments, apparatus, and equipment required by the codes, regulations and standards. Where specific testing requirements or procedures are not described, perform the testing in accordance with all pertinent codes and regulations and with recognized standards for testing.
- D. In the event that samples and test specimens are not properly taken, handled, stored or delivered or if other requirements of this Section are not complied with, Architect/Engineer reserves the right to delegate any or all of this work to others, or to take whatever action deemed necessary to ensure that sampling and testing are properly accomplished, for which all costs shall be borne by Contractor.
- E. Architect/Engineer reserves the right to disapprove the use of a specific testing laboratory, even after prior approval, if the laboratory fails to meet or comply with the requirements of this Section. If this should occur, immediately discharge the testing laboratory and retain the services of a different laboratory acceptable to Architect/Engineer.
- F. The testing laboratory shall meet the following criteria:
 - 1. Be capable of performing all of the required tests.
 - 2. Be regularly engaged in performing the types of services required.
 - 3. Have adequate facilities, materials, equipment, and personnel to perform the services.
 - 4. Have an adequately trained, experienced and qualified staff.
 - 5. Have at least one registered professional engineer licensed in the state in which the project is located who shall be capable of performing field tests, supervising laboratory testing and interpreting test results. The professional engineer shall be thoroughly knowledgeable in materials, soils, asphalt paving and concrete.
 - 6. Shall be able to be on the Project site within two hours after being notified.
 - 7. Comply with the requirements of ASTM C1077, ASTM D3740, ASTM D4561, ASTM E548 and ASTM E699.
 - 8. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

1.06 REFERENCE STANDARDS

- A. Conform to reference standards by date that the project was last bid.
- B. Obtain copies of standards when required by Contract Documents.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.07 SCHEDULING - LABORATORY SERVICES

- A. Except where otherwise specified, the Architect/Engineer will determine the number of samples to be taken, the date and time samples will be taken and tests made, the number and type of

tests to be performed, who will collect the samples, how they will be handled and stored and when laboratory personnel are required on site.

- B. Architect/Engineer will notify Contractor of his/her decision to take samples and/or have tests made and provide him with the pertinent information. Contractor is responsible for notifying the testing laboratory and for having the testing performed, on schedule.
- C. In addition to the above, Contractor shall make his own arrangements for the sampling and testing of materials he proposes to incorporate into the work. This shall not be paid for out of the cash allowance.
- D. Notify Architect/Engineer at least 72 hours in advance of the times at which scheduled samples or tests will be conducted.
- E. If samples and/or tests cannot be taken or performed when required, delay the work until such time that they can be accomplished. Where possible, any work that has been installed but has not been sampled or tested as required, shall be tested by other means. Upon Architect/Engineer's request, uncover any work, which has been buried or covered, and perform special tests designated by Architect/Engineer. If the work cannot be tested by other means, Architect/Engineer may declare the work unacceptable. All costs associated with noncompliance and for special testing shall be borne by the Contractor and not be paid for out of the cash allowance.
- F. Should the testing laboratory be scheduled to take or collect samples or to perform tests, and finds that it is unable to do so as a result of delays in construction, inclement weather, or any other reason, reschedule the tasks for a date acceptable to Architect/Engineer. Costs associated with times testing laboratory is unable to perform scheduled services shall be borne by the Contractor and will not be paid for under the allowance.
- G. Plan all work and operations to allow for the taking and collection of samples and allow adequate time for the performance of tests. Delay the progress of questionable work until the receipt of the certified test reports.

1.08 FIELD OBSERVATION OF CONTRACTOR'S WORK

- A. The Architect/Engineer will provide periodic observation of the Contractor's work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions. Verify that the existing substrate is capable of structural support or attachment of new Work being applied or attached. Examine and verify specific conditions described in individual specification sections. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance. Seal cracks or openings of substrate prior to applying next material or substance.

- B. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 FIELD QUALITY CONTROL

- A. Allow representatives of the testing laboratory access to the work at all time. Provide all equipment, labor, materials, and facilities required by the laboratory to properly perform its functions. Cooperate with and assist laboratory personnel during the performance of their work.
- B. Test specimens and samples shall be taken by the person(s) designated in other Sections, or as directed by Architect/Engineer. Conduct field sampling and testing in the presence of Architect/Engineer. Provide all materials, equipment, facilities and labor for securing samples and test specimens and for performing all field-testing.

END OF SECTION

SECTION 014500.01
STATEMENT OF SPECIAL INSPECTION AND TESTS-SED

N Y S EDUCATION DEPARTMENT Office of Facilities Planning, Room 1060 EBA Albany, NY 12234	STATEMENT OF SPECIAL INSPECTIONS AND TESTS As required by the 2015 International Building Code (IBC)
BCNYS § 1704.3 requires the project Design Professional to complete the Statement of Special Inspections and Tests. Completion of the Statement of Special Inspections & Tests and submission to the Building Department with the Construction Permit Application is a condition for issuance of the Building Permit.	
School District Hastings-On-Hudson Union Free School District	Building Farragut HS / MS
Project Title Auditorium Renovations to Farragut Middle School	
SED Project # 66-04-04-03-0-001-036	Project Address 27 Farragut Avenue, Hastings-on-Hudson , New York, 10706
Architect/Engineer H2M architects + engineers	
Name of Person Completing this Statement <u> </u>	Phone <u> </u> Date mm-dd-yyyy
Comments 	

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD	B R C E N F Y E S R E N C E	C R H E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYIN G NOTES IF NECESSARY
A. Steel Construction						
1. Material verification of high-strength bolts, nuts and washers.		X	Applicable ASTM material specifications. AISC 360-10 & N5	1704.3		
2. Inspection of high-strength bolting.		X	AISC 360-10 & N5	1704.3		
3. Material verification of structural steel.			ASTM A 6 or A 568 AISC 360-10 & N5	1704.3		051200
4. Material verification of weld filler materials.			AISC 360-10 & N5	1704.3		051200
5. Inspection of welding:			AWS D1.1, D1.3, D1.4; ACI 318: 3.5.2 AISC 360-10 & N5	1704.3, 1704.3.1,		051200

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD	B R C E N F Y E S R E N C E	C R H E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
a. Structural steel		X	NOTE: Special inspector shall perform ultrasonic testing of all full penetration welds.	1704.3, 1705.12.1		051200
b. Reinforcing steel		X				
6. Inspection of steel frame joint details.		X		1705.2.3		
B. Concrete Construction				1705.3 Table 1705.3		
1. Inspection of reinforcing steel, including prestressing tendons, and placement.		X	ACI 318: Ch. 20, 25.2, 25.3, 26.5.1-26.5.3	1908.4		033000
2. Inspection of reinforcing steel welding.			AWS D1.4; ACI 318: 26.5.4	Table 1705.3		
3. Inspection of bolts to be installed in concrete prior to and during placement.	X		ACI 318: 17.8.2	Table 1705.3		033000
4. Verify use of required design mix.		X	ACI 318: Ch. 19, 26.4.3, 26.4.4	1904.1, 1904.2, 1908.2, 1908.3		033000
5. Sampling fresh concrete: slump, air content, temperature, strength test specimens.	X		ASTM C 172, C 31; ACI 318: 26.4.5, 26.12	1704.4, 1905.6, 1914.10		033000
6. Inspection of placement for proper application techniques.	X		ACI, 318: 26.4.5	1908.6, 1908.7, 1908.8, 1908.10		033000
7. Inspection for maintenance of specified curing temperature and techniques.		X	ACI, 318: 26.4.7-26.4.9	1908.9		033000
8. Inspection of prestressed concrete.	X		ACI 318: 26.9.2.1	Table 1705.3		
9. Erection of precast concrete members.		X	ACI 318: Ch. 26.8			
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: 26.10.2			033000

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD		B R C E N F Y E S R E N C E	C R H E E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
C. Masonry Construction A= Level A Quality Assurance B = Level B Quality Assurance C = Level C Quality Assurance			ACI 530/ ASCE5/ TMS402 Table 3.1.1	ACI530.1 /ASCE6/ TMS602	1705.4		
Levels A and B A1. Verify to certificates to ensure compliance: B1. Verify certificates to ensure compliance.		X					
Level B B2. Proportions of site prepared mortar and grout.		X					042200
B3. Placement of masonry units and construction of mortar joints.		X					042200
B4. Location and placement of reinforcement, connectors, tendons, anchorages.		X					042200
B5. Prestressing technique and installation.		X					
B6. Grade and size of tendons and anchorages.		X					042200
B7. Grout specs prior to grouting.	X						
B9. Placement of grout.	X						
B10. Grouting of tendons.	X						
Level C:					1705.4		
C1. Size and location of structural elements.		X	ACI530/ ASCE5/ TMS402	ACI530.1 /ASCE6/ TMS602	1705.4		042200
C2. Type, size, and location of anchors.	X	X					042200
C3. Specified size, grade, and type of reinforcement.		X					042200
C4. Welding of reinforcing bars.	X						

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD	B R C E N F Y E S R E N C E	C R H E E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
C5. Cold/hot weather protection of masonry construction.		X				042200
C6. Prestressing force measurement and application.	X	X				
C7. Inspection prior to grouting.		X				042200
C8. Grout placement.	X					042200
C9. Preparation of grout specimens, mortar specimens, and/or prisms.	X					042200
C10. Compliance with documents and submittals.		X				042200
D. Wood Construction: Fabrication of wood structured elements and assemblies.				1705.5 1705.11.1 1705.12.2		
E. Soils				1705.6		
1. Site preparation.		X				312317
2. During fill placement.	X					312317
3. Evaluation of in-place density.	X					312317
F. Pile Foundations: Installation and load tests.				1705.7- 1705.9		
G. Pier Foundations: Seismic Design Category C, D, E, F.				1705.12- 1705.12.9		
H. Wall Panels and Veneers: Seismic Design Category E, F.				1705.12 - 1705.12.9		

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD	B R C E N F Y E S R E N C E	C R H E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
I. Sprayed Fire-Resistant Materials				1705.14		
1. Structural member surface conditions.				1705.14.2		
2. Application.				1705.14.3		
3. Thickness.			ASTM E 605	1705.14.4		
4. Density.			ASTM E 605	1705.14.5		
5. Bond strength.			ASTM E 736	1705.14.6		
J. Exterior Insulation and Finish Systems (EIFS)				1705.16		
K. Special Cases						
L. Smoke Control				1705.18		
M. Special Inspections for Seismic Resistance: Applicable to specific structures, systems, and components.						
1. Structural steel.	X		AISC Seismic	1705.12.2		
2. Structural wood.	X			1705.11.1		
3. Cold-formed steel framing.		X		1705.11.2		
4. Storage racks and access floors.		X		1705.12.7		
5. Architectural components.		X		1705.11		
6. Mechanical and electrical components.		X		1705.11		
7. Seismic isolation system.		X	ASCE7	1705.12.8		
N. Structural Testing for Seismic Resistance: Applicable to specific structures, systems, and components.				1705.13		
1. Testing and verification of masonry materials and assemblies.				1708.1		
2. Testing for seismic resistance.				1708.2		
3. Reinforcing and prestressing steel.			ACI 318			
4. Structural steel.			AISC Seismic			

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD	B R C E N F Y E S R E N C E	C R H E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
5. Mechanical and electrical equipment.						
6. Seismically isolated structures.						
O. Structural Observations						
Applicable to specific structures.						
P. Test Safe Load						
Q. In-Situ Load Tests				1708.1		
R. Preconstruction Load Tests				1709.1		
S. Other (list)						

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Asbestos and lead-based paint certification.
- B. Moisture control.

1.02 RELATED SECTIONS

- A. Section 014100 - Regulatory Requirements
- B. Section 015719 - Temporary Environmental Controls

1.03 ASBESTOS AND LEAD-BASED PAINT CERTIFICATION

- A. Contractor shall submit the enclosed "Asbestos and Lead-Based Paint Certification" upon completion of all work.

1.04 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, Owner's Construction Representative 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, Owner's Construction Representative 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, Owner's Construction Representative and Architect/Engineer.
 - 2. No person shall be allowed back into the affected area without permission of the Owner.

1.05 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

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.
- 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/ANSI 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 The temporary utility before use. Obtain required certifications and permits.

1.03 PROJECT CONDITIONS

- A. Temporary Utilities: The contractor will prepare a schedule indicating dates for implementation and termination of The 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. The Contractor is responsible for the following:
 - 1. Installation, operation, maintenance and removal of The 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 The 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 "015001 - Uniform Safety Standards for School Construction."
 - 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. Provide 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 8 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 representatives, and necessary 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 Representative. Offices shall be located in the designated staging area. The 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 The contractor's field office, all articles for First Aid treatment. The contractor shall also establish standing arrangements for the immediate removal and hospital treatment of any employees and other persons on the job site who may be injured or who may become ill during the course work.

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 The 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 the floor level, spaced so that a 50-foot extension cord can reach the work area. Provide separate 110-120 Volt, 20 Amp circuit for The 4-gang outlet (4 outlets per circuit).
14. Temporary electric power for Construction Manager'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 the 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 the 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 The 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 1000 sq. ft. of area.
3. Stairways: Provide one 200 watt lamp per landing at stairways.
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 charges.

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 the 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 Staging Area 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 the Architect / 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 the 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 trucks at no additional charge to the Owner.
- B. The 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. The 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, the Contractor shall coordinate delivery of his materials with the Owner's Construction Representative who will determine when large deliveries shall be made and shall 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. The 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 with fencing 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 and an 18' x 25' security fence around scaffolding that provides access to the roof. Locations are designated on the drawing for use by all trades. All fenced areas to be 8' 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. The 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. The 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. The 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. The 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. The 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 Contractor's employee 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 Architect or Owner's Construction Representative.
 - 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 the Contractor shall thereafter furnish, at no additional cost to the Owner, any and all temporary service required by such Contractor's work.
 - 3. Remove and relocate such temporary facilities as directed by the Owner's Construction Representative 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. The 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 to eliminate any odors / 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 Contractor's 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 TEMPORARY ROADS AND PERMANENT PAVED AREAS:

- A. General Construction Contractor shall construct and maintain temporary road areas adequate to support loads and to withstand exposure to traffic during construction period. See staging plan for construction requirements, materials, thicknesses, locations, etc.
 - 1. Includes access for delivery through staging area to building work areas, and to equipment and storage areas and sheds.
 - 2. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.
 - 3. Temporary areas are installed and/or maintained for access to all required areas of the sites.

4. Contractors will be permitted to utilize existing campus roads, as designated (as segregated by the Owner - if required).
5. Road Cleaning: Maintain roads and walkways in an acceptably clean condition. This includes the removal of debris daily, if required, and/or a minimum of once a week due to all project traffic. Road cleaning equipment to be wet/vacuum type. The General Construction Contractor will clean roads for debris from building-related activities.
6. General Construction Contractor shall provide snow plowing of temporary road, parking area, access route, and a 5' walkway to office trailer. Provide snow removal of walkways to Owner's Construction Representative office trailer. The school district will provide snow plowing of established routes.
7. Staging Areas:
 - a. Temporary parking by construction personnel shall be allowed only in areas so designated and confirmed with the Owner's.
 - b. Traffic Regulations:
 - 1) Access through Owner's entrances shall be limited. Confirm access locations and time frames with the Owner's Construction Representative or Owner when required.
 - 2) Utilize only entrances/temporary roads as designated.
 - 3) Maintain all Owner traffic regulations and site access.
 - 4) Construction parking will not be allowed adjacent to District buildings, additions or monuments. Construction parking will be located in areas designated by the Owner's Construction Representative or Owner.
 - 5) Construction employee parking to be located as directed by the Owner's Construction Representative.

3.19 TRAFFIC CONTROLS:

- A. General Construction Contractor shall provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads, barricades, flagmen, etc. Comply with requirements of authorities having jurisdiction.

3.20 DEWATERING FACILITIES AND DRAINS

- A. The Prime Contractor is directly responsible for dewatering of their excavations. The responsibility of dewatering of the site as to facilitate the work will be the responsibility of the General Construction Contractor, coordinate with the Owner's Construction Representative
- B. Comply with requirements in applicable Division 31 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, common use of dewatering and drainage facilities is recommended. Maintain Project site, excavations, and construction free of water.
 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties, nor endanger permanent drainage systems. Provide temporary drainage where roofing or similar waterproof deck construction has been completed.
- C. Remove snow and ice, on a daily basis, to minimize accumulations.

3.21 ROOF PROTECTIONS

- A. The Roof 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 Roof Construction Contractor of their work and required roof protection areas.

- B. When requested by other trades as noted above, the Roof 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 Roof 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.

3.22 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 Owner 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 The project site.
- G. Project Sign Requirements:
 - 1. Ten (10) signs shall be provided and located (and relocated) as designated by the Owner's Construction Representative or Owner 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, Owner's Construction Representative, and the Owner. Prior to the start of any actual work the signage must be reviewed / approved by the Owner's Construction Representative or Owner.

3.23 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.

3.24 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.

3.25 SECURITY ENCLOSURE AND LOCKUP:

- A. The 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.

3.26 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.

3.27 TEMPORARY ENCLOSURES

- A. The Roof 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 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 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.

3.28 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 The 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. The location shall be equipped with a 3 foot wide by 7 foot high hollow metal door/frame with hinges, closer and exit device hardware.

3.29 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.

3.30 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 The 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

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The Work of this Section includes the furnishing of the Owner's Construction Representative's Field Office (Trailer).
 - 1. The Owner's Construction Representative's Field Office shall be furnished by the General Construction Contractor.
 - 2. It shall be provided within the time period specified hereinafter.
- B. The Contractor shall also furnish the following to the Owner/ Owner's Construction Representative's all in accordance with the specifications contained herein as follows:
 - 1. Miscellaneous equipment and supplies
 - 2. Materials
 - 3. Computer system with associated peripheral computer related equipment
 - 4. Services as may be specified herein.
- C. The Contractor shall install two (2) new telephone services (telephone and fax/modem) for the exclusive use of the Owner's Construction Representative's. The telephone services shall be provided to the Construction Manager's construction trailer located on the site as selected by the Owner's Construction Representative's. The costs associated with providing the Owner's Construction Representative's's telephone services shall be included in the price as-bid and is not eligible for payment out of any cash allowance.
- D. This Section also specifies the requirements for Field Offices to be established by the Contractor for the exclusive use of the respective Prime Contractor.

1.02 CARE AND PLACEMENT

- A. Field offices shall be placed where directed by the Owner's Construction Representatives's in accordance with site utilization requirements.
- B. All field offices shall be installed to meet all standards of the Occupational Safety and Health Act of 1970 and subsequent revisions.
- C. In the event of damage to existing facilities, including but not limited to: tanks, driveways, walks, pavement, buildings, pipes, conduits, valves, and electrical facilities then immediately make all repairs and replacements to an equal condition prior to the event.

1.03 QUALITY PERFORMANCE

- A. Comply with and perform all work in accordance with the requirements of local authorities and utility companies having jurisdiction.

1.04 SUBMITTALS

- A. The Contractor shall submit the following:
 - 1. Floor plan of the proposed Field Office of the Owner's Construction Representative's.
 - 2. Catalog cuts of miscellaneous equipment and supplies if they are different from that specified.
- B. The Contractor shall also provide a listing of the companies providing specified services with telephone number and contact name. Provide references for each company when requested.

PART 2 - PRODUCTS

2.01 OFFICE OF PRIME CONTRACTORS

- A. The Contractor shall provide and maintain during the life of this contract separate and suitable offices at the site that shall be used as the Contractor's superintendent office.
- B. Provide adequate facilities for maintaining record documents, for holding small meetings and a telephone upon which calls may be received from Owner, Architect/Engineer and others. The telephone shall be equipped with a fax machine and an answering machine.
- C. The Contractor shall install, maintain, and repair if necessary, temporary electric and telephone to their own field office.

2.02 MATERIALS, EQUIPMENT AND SERVICES FURNISHED TO THE OWNER BY THE GENERAL CONSTRUCTION CONTRACTOR

- A. The Contractor shall also furnish the following equipment and services that shall not be eligible under any cash allowance. All items specified herein shall be new and remain the property of the Owner unless otherwise stated. The following shall be furnished:
 - 1. Two (2) 23-gallon plastic wastepaper basket.
 - 2. New 50-person industrial first aid station, OSHA approved, by Acme United or equal, order no. ACM-1403 (Huntington Business Products) or equal.
 - 3. Thermometer, with indoor and outdoor sensing bulbs, and high, low instantaneous reading, with magnetic reset function by Radio Shack or equal.
 - 4. Two U.L. and F.M. approved fire extinguishers with a minimum rating of 4A-60B:C.
 - 5. Standard manufacturer operating manuals for all equipment supplied.
 - 6. One (1) 30" x 60" desk with 4 side drawers and a locking center drawer.
 - 7. One (1) new swivel task chair for use with desk equal to order no. SUP-12223643 by Superior Chair (Huntington Business Products).
 - 8. One (1) new rolling stand with top, Model No. 76MR/76TP from Plan Hold, catalog #27, or equal.
 - 9. Two (2) 48" x 60" reference tables.
 - 10. Six (6) folding chairs.
- B. Janitorial Services - Provide janitorial services two (2) times each week. Thoroughly clean and dust entire office and leave in a condition satisfactory to Architect/Engineer or Owner's Construction Representative. Provide this service through final completion.
- C. Ownership of Furnishings - All items to be provided by Contractor under this paragraph shall remain the property of the Owner unless otherwise stated.
- D. Internet Access Service - The Contractor shall also pay for monthly Internet access fees at a cost not to exceed \$45.00 per month for the length of the contract up to the date of final completion.
 - 1. This cost shall be included in the price as bid and shall be billed directly to the General Construction Contractor.
 - 2. The service provider shall be selected by the Architect/Engineer. The General Construction Contractor shall arrange for the service.
 - 3. Internet access will be used by the Architect/Engineer, Owner's Construction Representative and the Owner to send email to manufacturers, vendors, Architect/Engineer's home office, the Contractor's home office, other prime Contractors, regulatory agencies and the like.

4. The Contractor may use this service at the discretion of the Architect/Engineer. Only project related transmissions will be allowed.
 5. If high speed DSL or cable service is available, then the Contractor shall arrange for this service in lieu of a dial up service.
- E. All items specified herein are subject to the approval of the Architect/Engineer or the Owner's Construction Representative's.
- F. Equipment shall be delivered to the site and turned over to the Architect/Engineer or the Owner's Construction Representative via a type written transmittal form.
- G. All equipment that is to remain the property of the Contractor shall be new.
1. Equipment that is to remain the property of the Owner shall also be new and be provided in it's factory packaging, unopened until delivered to the Owner/Architect/Engineer.
 2. Maintenance of all supplied equipment shall be the Contractor's responsibility up to substantial completion.
- H. All items shall be delivered prior to the first application for payment, but no later than the day the Owner's Construction Representative's's Trailer is delivered.
- I. Construction Manager's Field Trailer:
1. Office - The Contractor shall furnish, equip, and maintain a field office at the site for the exclusive use of Owner/Architect/Engineer.
 - a. The field office shall be of substantial weatherproof construction, with a usable floor space of not less than 10' x 40' overall.
 - b. Office may be in an approved, near new condition, independent trailer, completely skirted with insulation and with sufficient landings and stairs at each door.
 - c. Submit a scaled floor plan of the trailer.
 2. Duration - Provide office by no later than 30 calendar days from the date of the Notice To Proceed and maintained during the life of the Contract, up to the date of the Final Certificate of Completion.
 3. Location - As directed by Owner/Architect/Engineer or Owner's Construction Representative's. Relocate during the progress of the work, without additional cost to Owner, as may be required by the Owner/Architect/Engineer or Owner's Construction Representative's.
 4. Utilities - Provide the following in sufficient size, quantity, and capacity, as approved by the Owner/Architect/Engineer.
 - a. Windows for natural light and ventilation, with locks, screens, and shades or curtains.
 - b. Lighting acceptable to the Owner/Architect/Engineer/Owner's Construction Representative's.
 - c. Door with screen, with hasp and padlock and five keys for Owner/Architect/Engineer/Owner's Construction Representative use. Two (2) doors minimum. Provide two (2) commercial grade foot mats at each door.
 - d. Air conditioning unit and heater in each room, sized to maintain an indoor temperature of 60 deg. F with an outdoor temperature range of 10 deg. F to 90 deg. F.
 - e. 110 volts, 100-amp electric service with sufficient receptacles spaced around the room.

2.03 REMOVALS

- A. Remove all items provided under this Section except as otherwise specified.

PART 3 - EXECUTION

3.01 REMOVAL OF UTILITIES, FACILITIES AND CONTROLS

- A. Remove temporary above grade or buried utilities, equipment, facilities and materials.
- B. Remove underground installations to a minimum depth of 2 feet or as specified elsewhere.
- C. Regrade area to existing slope and elevation and restore the surface to its existing condition or to the condition shown on the Contract Drawings.
- D. The Contractor shall inventory all equipment that has been turned back to the Contractor prior to agreeing to final payment.

END OF SECTION

GENERAL

1.01 SCOPE

- A. Work under this section includes furnishing all labor, materials, equipment and appliances necessary to maintain both vehicular and pedestrian traffic, to protect the public from all damage to person and property, and to minimize inconveniences to the residences and businesses adjacent to the contract area for the duration of the contract. All work shall be done in accordance with the specifications, and the appropriate State, County or local agency, and in accordance with the Manual of Uniform Traffic Control Devices (MUTCD).

1.02 GENERAL

- A. The Contractor shall maintain traffic over a reasonably smooth travel way which shall be so marked by signs, delineations and/or other methods so that a person who has no knowledge of conditions can safely, and with a minimum of discomfort and inconvenience, ride, drive or walk over all or any portion of the roadway under construction. This shall include the maintenance of temporary pavement in accordance with the appropriate temporary pavement specifications.
- B. The Contractor will be required to prepare and submit a detailed maintenance and protection of traffic plan to the appropriate road agency in order to obtain the road opening permit. The plan shall outline a schedule of operations for the maintenance, protection and detouring of traffic, showing in complete detail the methods, sequences, procedures and facilities he proposes to install. The contractor shall secure written approval from that agency prior to beginning work. In addition, the contractor shall submit the approved plan to the Engineer for record prior to beginning work.
- C. All detour schemes and maintenance details shall conform to the requirements of the latest edition of the MUTCD and Section 619 of the New York State Standard Specifications.
- D. The Contractor is placed on notice that the maintenance and protection of traffic over this highway during construction is considered as important and necessary an item of work as is the actual construction itself. The Contractor shall at all times conduct his operation in a manner to ensure the safety of motorists, pedestrians and his own employees.
- E. The Contractor shall protect the user from damage to person and property by reason of any construction operation (i.e., painting, paving, blasting, tree work, demolition, etc.) by such protective screens, devices or methods as are approved by the appropriate governing agency.
- F. The Contractor shall be responsible for the maintenance within the limits of the contract of the entire pavement, drainage facilities and other highway elements, both old and new, beginning on the date construction commences and ending on the date the contract is officially accepted.
- G. The Contractor shall schedule his work so as to minimize the amount of the old travel way that is destroyed or substantially damaged at any one time.
- H. Throughout the course of the work, the health and welfare of the people shall be provided for. The Contractor shall ascertain, at least one week in advance of proposed work, the specific needs of individuals whose homes or places of business may be inaccessible for periods of time while required construction work is in progress. In all such cases, the Contractor shall make all arrangements with health, safety and protective agencies to ensure that any and all emergency or accidental needs of seriously hampered people will be cared for. Roads which must be closed to traffic completely shall be completed during the normal work week. One week's advance notification of construction shall be given to affected area residents.

1.03 MATERIALS

- A. All materials used shall comply with the requirements for the various items or materials as established in the specifications or the contract plans.
- B. All temporary signs, delineators, barricades, lighting and other warning and guiding devices shall be as approved by the Engineer, and will remain the property of the Contractor.
- C. All materials, equipment and workmanship for electrical installations shall be in strict compliance with the Standard Code Requirements and the work shall be performed by licensed electricians. The Contractor shall obtain, supply and pay for all required electrical energy, and shall make all necessary arrangements with the utility company for service points. All electrical services, permits and certificates shall be obtained and paid for by the Contractor.

1.04 CONSTRUCTION DETAILS

- A. The Contractor shall generally provide a travel way suitable for maintaining a minimum of two lanes of traffic. This travel- way shall be kept well-drained and reasonably smooth and hard at all times, and free of potholes, bumps, irregularities and depressions that hold or retain water.
- B. Warning Signs & Delineators
 - 1. The Contractor shall erect barricades, detour signs, warning lights and other facilities approved by the State or appropriate agency at the beginning, end and for the entire length of any detours to adequately warn the traveling public that the road is closed and indicate the direction and route of the detour. He shall conduct his operations to ensure a minimum of delay to traffic.
 - 2. The Contractor shall furnish, erect and maintain proper reflectorized signs, indicating to motorists the status of the highway under construction.
 - 3. All signs shall be kept clean, mounted at the indicated height and so placed as to be effective both day and night. Signs, warnings, delineators and barricades shall be used to adequately inform the motorist of any unusual or unsafe condition and to safely and clearly guide him through the contract area. Such signs, barricades, warnings or devices shall be so placed and lighted as to give timely warning and permit the motorist to take the necessary action to traverse the area safely. Barricades and signs shall be lighted when and as required.
 - 4. The Contractor shall delineate areas where there is a drop-off near the edge of the travel lanes and areas on which it is unsafe to travel. Where the drop-off is less than six inches and where soft or unsafe areas occur, an approved delineator shall be placed along the edge of the travel way at intervals of not more than 200 feet. Where the drop-off is greater than 18 inches, a continuous delineation consisting of a white board or band shall be used in addition to individual delineators.
 - 5. Thirty to fifty-gallon drums or containers set on end may be used as delineators, provided they are painted orange and white and kept clean at all times. Other markers or delineators may be circular or rectangular in shape, and shall be constructed of reflective sheeting having a minimum area of 20 square inches or reflective buttons having a minimum diameter of three (3) inches.
 - 6. All reflective delineators or markers shall be yellow or amber in color, except those at entrances to commercial establishments, where the Contractor shall place a green reflective marker on each side of the designated safe entrance to the establishment. The entire entrance area between adjacent green markers shall be kept safe and smooth for convenient ingress and egress. Delineators shall be substantially mounted so that the bottom of the reflective unit is four feet above the elevation of the travel way. Any area judged to be particularly hazardous shall be marked by the use of oil-burning flares or signal flashers with a large reflectorized orange lens in addition to the reflective markers.

7. All signs, markers and other facilities shall indicate actual conditions existing and shall be moved, removed or changed immediately as conditions require. Details and types of signs, temporary barricades, timber curb and other devices are shown on Standard Structure Sheets, Manual of Uniform Traffic Control Devices, of the New York State Traffic Commission. These are minimum requirements, and the Contractor shall have an adequate quantity of each available for use as required. If conditions warrant additional signs may be required. In that event, they shall be consistent with the arrangements, material requirements and details of those shown on the Standard Structure Sheets.
 8. Lighted barricades shall be fully equipped with complete electrical facilities including fixtures, lamps, conduits, switches, cut-outs, boxes, cable and all other required equipment, appurtenances and connections to the service points designated by the utility company as necessary to install and light the barricades. The Contractor shall set and adjust time switches and other equipment as required to put the lighting system in satisfactory operation.
- C. Maintenance
1. The Contractor shall furnish materials, labor and equipment at any time, day or night, to immediately repair, remedy and prevent washouts, formation of holes, ruts and depressions, sunken trenches and the destruction or sinking of temporary pavements. This applies when the work is underway and when the work is temporarily suspended for any period of time. Special attention shall be given to maintenance of a satisfactory travel way over weekends, holidays and during the winter season.
 2. Any damage to any portion of the work occasioned by lack of adequate maintenance shall be repaired by the Contractor at his own expense.
- D. Whenever it is necessary to maintain traffic, the Contractor shall employ a sufficient number of competent flagmen during the time traffic is to be maintained. The Contractor shall also provide a sufficient number of competent flagmen in areas where traffic is congested, particularly where construction equipment is operating.
- E. Under this Item, the Contractor shall construct and maintain at all times, where required temporary bridges or bridging across pipe trenches, excavations, obstructions and newly laid pavements to provide adequate ingress and egress for pedestrian and vehicular traffic to and from private driveways, business and commercial establishments or for main street intersections and heavily traveled crossings.
- F. The Contractor will be required, after the installation of all pipes and necessary appurtenances thereto, to immediately backfill all trenches; compact same with the surface of the fill graded off; and install temporary pavement to permit the resumption of traffic without delay. The surfaces of all trenches shall be maintained continually by the Contractor to carry traffic smoothly, safely and without interruptions or slowdowns until the permanent pavement has been restored.
- G. Signs
1. All highway signs and supports within the contract limits are to remain under the control and jurisdiction of the governing road authority and are to be properly maintained for the duration of the contract by the Contractor.
 2. The Contractor shall not remove signs until directed to by the governing road agency or the Owner.
 3. Existing signs or markers lost or damaged because of negligence on the part of the Contractor shall be replaced at the Contractor's expense.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Control of environmental pollution and damage that the Contractor must consider for air, water, and land resources in preparing a bid and while constructing the project. This Section includes management of site aesthetics, noise, solid and liquid waste and wastewater, and other pollutants that may be generated by the Contractor.
- B. Include all costs associated with environmental protection as specified herein and as specified in other Sections of these specifications in the total price bid.

1.02 DEFINITIONS

- A. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:
 - 1. Adversely effect human health or welfare,
 - 2. Unfavorably alter ecological balances of importance to human life,
 - 3. Impact wetlands,
 - 4. Effect other species of importance to man, or;
 - 5. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.
- B. Definitions of Pollutants:
 - 1. Sediment: Soil and other debris that has been eroded and transported by runoff water.
 - 2. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
 - 3. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
 - 4. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
 - 5. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalies, herbicides, pesticides, organic chemicals, and inorganic wastes.
- C. Sanitary Wastes:
 - 1. Sewage: Domestic sanitary sewage and human and animal waste.
 - 2. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 PROTECTION OF ENVIRONMENTAL RESOURCES

- A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this Contract. Confine activities to areas defined by the Contract Documents.
- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the Architect/Engineer. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.

- C. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this Contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
- D. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
1. Box and protect from damage existing trees and shrubs to remain on the construction site.
 2. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
 3. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
- E. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
1. Temporary Protection of Disturbed Areas: Construct diversion ditches and berms to retard and divert runoff from the construction site to protected wetlands areas as defined in the Clean Water Act and federal, state and local regulations.
 2. Erosion and Sedimentation Control Devices:
 - a. Construct or install all temporary and permanent erosion and sedimentation control features as shown or specified in the Contract Documents and as required by the Owner pursuant to direction of the regulatory authority.
 3. Manage borrow areas on and off Owner property to minimize erosion and to prevent sediment from entering nearby property, watercourses and local streets.
 4. Manage and control spoil areas on and off Owner property to limit spoil to areas shown on the Environmental Protection Plan and prevent erosion of soil or sediment from entering nearby property, watercourses or streets.
 5. Protect adjacent areas from degradation by temporary excavations and embankments.
- F. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment.
1. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule.
 2. Transport all solid waste off Owners' property and dispose of waste in compliance with Federal, State, and local requirements.
 3. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
 4. Handle discarded materials other than those included in the solid waste category as directed by the Architect/Engineer.
- G. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this Contract.
- H. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.

- I. Control movement of materials and equipment during construction to prevent violation of water pollution control standards of the Federal, State, or local government.
- J. Monitor water areas affected by construction.
- K. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources.
 - 1. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State and Federal emission and performance laws and standards.
 - 2. Maintain ambient air quality standards set by the Environmental Protection Agency and State, for those construction operations and activities specified.
- L. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
- M. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinkle, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
- N. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
- O. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- P. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Architect/Engineer. Maintain noise-produced work at or below the decibel levels and within the time periods specified in accordance with OSHA and local ordinances, whichever is more restrictive.
 - 1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 5:00 p.m. unless otherwise permitted by local ordinance or by the Architect/Engineer.
 - 2. Repetitive impact noise on the property shall not exceed the following dB limitations:
 - 3. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this Contract, consisting of, but not limited to, the following:
 - a. Use shields or other physical barriers to restrict noise transmission.
 - b. Provide soundproof housings or enclosures for noise-producing machinery.
 - c. Use efficient silencers on equipment air intakes.
 - d. Use and maintain efficient intake and exhaust mufflers on internal combustion engines.
 - e. Line hoppers and storage bins with sound deadening material.
 - f. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.

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 counsel.
- 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, disfigurements 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 Architect / 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 Architect / 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 the 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: The 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 Owner's 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 prime 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 means 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. Vacuum clean acoustic ceilings.
 - 4. Repair, patch, and touch-up marred surfaces to specified finish and to match adjacent surfaces.
 - 5. Remove foreign material from exterior masonry.
 - 6. 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.
 - 7. Polish bright metal by damp wiping and drying with a suitable cloth. If a polished appearance is not thereby produced, apply appropriate metal polish.
 - 8. Clean and polish all stainless steel surfaces, including control panels supplied under this Contract.
 - 9. 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.
 - 10. Repair or repaint damaged pavement markings.
 - 11. Clean supply vents and exhaust grilles. Clean gutters and downspouts.
 - 12. Remove all rust spots and stains from new and pre-existing concrete, painted surfaces, and all other surfaces.
 - 13. Wash all existing floors that were in any way impacted by the construction operations.
 - 14. Rake clean landscaped surfaces. Final mow all areas grassed and sodded during the work.
 - 15. 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.
 - 16. Fill in all holes in concrete that remain after temporary handrail is removed. Non-shrink grout shall be used.
 - 17. Thoroughly clean all pits, galleries, manholes, pipes, channels, tanks, wells and all structures entered upon.
 - 18. Elevators: Clean all interior surfaces of the car including hoistway doors and services of the corridors on the side of the elevator. Polish all bright metal surfaces. Clean and spray buff resilient tiles. Dust and damp wipe elevator cab doors, walls and bright work.

19. Magnet sweep all exterior lawn and walkway areas to ensure that no stray nails / screws, etc. remain in lawn areas or 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, utilities, and other Prime Contractors.
- 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 (G732a/CMa 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. 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. Name plate 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. Drawings (pictures or exploded views) which clearly depict and identify each part, suitable for assembly and disassembly of entire system and each component
 10. Wiring and control diagrams, if applicable
 11. Panelboard circuit directories including electrical service characteristics, if applicable
 12. Part list with current prices; ordering information; and recommended quantities of spare parts to be maintained in storage
 13. 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
 14. Name, address, and telephone number of nearest parts supply house and nearest authorized repair service center.
 15. List of recommended spare parts and the recommended number of each per unit and per group of units.
- J. 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.
- K. 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 - ALTERNATES for requirements related to updating the manual(s).
- L. 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

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.
- B. Additional sets will be furnished to the Contractor at \$250 per set.
- C. One (1) complete set of Contract Documents shall be kept in the field office.

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, and Owner's Construction Representative regulatory agencies and other parties designated by the Owner.
- C. Provide a drawing rack for storage of plans.
- D. Maintain these documents in a clean, dry, legible condition throughout the entire contract period.
- E. Make documents available at all times for inspection by Owner, Architect and Owner's Construction Representative.

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. The Contractor shall include a lump sum amount of [\$25,000] in the bid amount for preparation of record drawings.
 - 1. Stipulated amount will be released when the record drawings have been accepted by the Architect/Engineer.
- D. Legibly mark the Contract Plans to record actual construction, including, but not limited to the following:
 - 1. All as-built work.
 - 2. All approved field changes and conditions.

- E. Shop Drawings: Maintain as record documents. Legibly mark-up to show changes made due to field conditions encountered during construction.
- F. The Contractor shall be required to keep accurate record drawings, in hard copy format, as well as AutoCAD 2008 or newer digital format, of the work actually performed which is in accordance with the Contract Documents and that which deviates from them.
- G. As work progresses, the Contractor shall maintain an on the field set of hard copy drawings, a complete and accurate set of field notes clearly delineating all work as it is actually installed. This set of drawings shall be available at all times for the Owner, Architect and Owner's Construction Representative to review and shall be examined at all jobsite meetings.
- H. Do not permanently conceal any work until required information has been recorded.
- I. Concurrent with each submission of a contractor partial payment requisition, the Contractor shall submit a paper copy of up to date record drawings, including the latest corrections. Incomplete or inaccurate record drawings will be sufficient grounds for refusal to process payment requisition.
- J. Final record drawings shall be hard copy format and AutoCAD 2008 or newer digital format, completed by a competent draftsman or CAD operator with the following information as a minimum:
 - 1. Complete and accurate listing of all imbedded and underground conduits. Drawings shall accurately show exact locations of all conduits including horizontal and vertical dimensions and explicitly list all conduits and fix their location off of building structures or monuments. Imbedded conduits shall include those below the floor slab and those installed in building walls.
 - 2. Complete and accurate listing of all exposed conduits.
 - 3. In a neatly logically organized table, a complete listing of all conduits with each individual conduit being given its own number and each junction or pullbox being given its own designation. This table shall list the starting and ending point of all major home runs along with all branch conduits and conduits main function.
 - 4. In a neatly logically organized table a complete listing of all conductors within the conduits listed above. Each conductor table shall individually list the conductors installed within each conduit and for each conductor shall designate the starting point or termination, complete path through all conduits and junction boxes, final point or termination, conductor color or marking and circuit function. This shall be done for each conductor installed through the project.
 - 5. An accurate frontal elevation drawing of all motor control centers, control centers other major equipment installed. Drawings shall show all devices as installed in door or faces or equipment.
 - 6. A dimensioned drawing of all equipment installed including generator sets, load banks, transformers and all major equipment.
 - 7. Field changes of dimension and detail.
 - 8. Changes made by Change Order.
 - 9. Clarification plans not on original contract.
- K. At final contract closeout Architect / Engineer will review preliminary set of final record drawings. After approval of this submission, the contractor will be required to submit one (1) set of hard copy drawings and one (1) digital CD-ROM disc including all as-built drawings in AutoCAD 2008 or newer format as detailed above. No portion of the line item bid amount in the proposal for the record drawings will be released until final record drawings have been submitted and approved. No exceptions.

1.05 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.
- H. At completion of project project prior to the final project close-out meeting, deliver marked-up record documents to the Architect / Engineer.
- I. Accompany submittal with transmittal letter, containing:
 - 1. Date.
 - 2. Project title and number.
 - 3. Contractor's name and address.
 - 4. Title and number of each record document.
 - 5. Certification that each document as submitted is complete and accurate.
 - 6. Signature of Contractor or its authorized representative.
- J. Upon completion of the work, Contractor shall prepare and furnish the Architect / Engineer a set of marked up prints of the as-built drawings for review, with all changes conspicuously circled or otherwise emphasized.
- K. Prior to final payment, Contractor shall conform the drawings to the comments made by the Engineer and then provide the Owner a complete reproducible sets of as-built drawings on 24" x 36" paper and a set in digital AutoCAD 2008 or newer format.
- L. 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. Each drawing shall bear the legend "AS-BUILT" and the name of the Contractor in heavy black lettering 1/2 inch high and be certified as complete and accurate.

- M. 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. Electronic media made available is without guarantee of compatibility with the Contractor's software or hardware. If the Contractor wishes to take advantage of the offer, the Contractor will be required to execute an indemnification and hold harmless agreement with the Engineer and pay the Engineer \$20.00 per contract set to cover the cost of providing electronic media. Payment shall be by check, payable to H2M architects + engineers., in advance of picking up the requested materials. Electronic media shall be returned to the Architect / Engineer upon acceptance of the as-built drawings by the Owner.

1.06 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.

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.
- F. Where manufacturer services are specified for control panel or control center startup, the representative shall be experienced and trained to work on and field rewire such devices.
 - 1. Field representatives for control panel startup shall understand the control sequence specified and, in the case of programmable logic controllers, are able to make revisions to the factory program using handheld programming devices or laptop computers.
 - 2. The time spent by the representative to correct a PLC program shall not be included in the time specified for startup.
 - 3. The Owner will not pay for time spent in the field to correct a PLC programming problem.

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 Architect / 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 Architect / 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, Architect/Engineer and Owner's Construction Representative.
- B. The service visits shall be scheduled at least 2 weeks in advance so that the Owner, Architect/Engineer and Owner's Construction Representative 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 / 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.
- I. For control panels, explain the control sequence, timing structure, and safety precautions when working inside the panel, terminal wiring system, PLC program, if applicable, operator interface(s) and control logic.
- J. Explain PLC LED input and output numbering system, if applicable. If control relays are used, explain technique for their replacement.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 – GENERAL

1.01 SUMMARY

- A. The systems installed under Divisions 23 and 26, as well as pieces of equipment provided under other Divisions that connect to or interface with the systems of Division 23 and 26 will be evaluated, started, and tested (commissioned) to ensure that each performs per the intent of the design and/or representations made relative to performance, efficiency, and suitability for application in this project.
- B. Owner will employ an independent Commissioning Authority (CA). The CA is an independent and knowledgeable third party, hired to verify that the systems work as per the design intent and provide the requirements of the commissioning responsibilities as designated in this specification. The CA will inform the Owner of the results of the commissioning, and provide suggestions, as necessary, to correct deficiencies in observed performance or installation.
- Commissioning Objectives
Commissioning is intended to achieve the following specific objectives:
1. The Owner will ultimately inherit a building that is designed to meet the needs of the user and is built and functions as designed.
 2. Systems performance expectations are clearly established.
 3. The users, project managers, operating personnel, contractors and designers will be protected from any dislocation created by the fragmented corrections and undocumented deficiencies.
 4. Corrective actions will be made in a manner that will not compromise long-term utilization or operating expense.
 5. The Owner's operating personnel will have the integrated system training needed to confidently operate and maintain the systems.
- C. The CA will be employed directly by the Owner or Owner's Representative to perform commissioning duties. Sections 230800 and 260800 outline the specific commissioning responsibilities of each Contractor for that division, and also obligate the General Contractor/Construction Manager to coordinate and manage the commissioning responsibilities of those subcontractors.
1. This section of the specification describes the process for commissioning and defines the responsibilities of the construction team, including the Construction Manager.
 2. The commissioning process shall be applied to all equipment, components, and systems as listed in this section, including specific interfaces to and from equipment and systems provided under separate contracts.
 3. Building Commissioning work is a joint team effort to ensure that all systems function together properly to meet the design intent, and to document system performance parameters for fine-tuning of control sequences and operations procedures. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment start-up, control system calibration, testing and balancing, training, and performance testing. This section does not supersede other requirements of the specifications. It may, though, expand on some of them.
 4. Complementary to the Contractor's responsibility to commission the building systems, it should be noted that an Owner's CA will be involved. This Owner's CA will provide equipment-systems installation inspection and performance verification. **These Owner's verifications will be a prerequisite to final equipment and systems acceptance by the Owner as per design documents.** It should be emphasized that this Owner's systems verification does not negate the Contractor's obligations to fully commission the building systems or relieve them of any contractual obligations. The Contractor's personnel shall be made available to execute all aspects of the Commissioning Process until the Owner and the Engineer of Record accept the final results. Commissioning Program tasks and meetings may be repeated until the Owner and the Engineer of

Record are satisfied and will not be fixed as one time, one chance events for the Contractor.

5. The Owner's CA will verify equipment-systems installation and performance after the Contractor provides written notice that the building equipment and systems have been completed, tested and are fully operational. Upon this notification, Owner's CA will verify the installation and performance of the equipment and system(s). If corrections are required after the initial verification, the Owner's CA will provide one (1) additional installation and performance verification. Subsequent installation and performance verifications will be at the Contractor's expense. The Contractor is responsible for all systems and equipment until final acceptance by both the Engineer of Record and the Owner. All guarantees and warranties shall not begin until final acceptance by both the Engineer of Record and the Owner.

1.02 CONSTRUCTION TEAM RESPONSIBILITIES

- A. Within four (4) weeks of the award of the contract, the Mechanical, and Electrical Contractors shall submit the names of the Project Manager who will be the commissioning coordinator for this project, as well as the names, addresses, phone numbers and qualifications of subcontractors' representatives and factory trained manufacturers' representatives for all equipment and systems required to participate in the commissioning process as specified in this Section.
- B. Each Contractor, and all his sub-trades and suppliers, shall cooperate with the CA in carrying out the commissioning process. In this context, each Contractor shall:
 1. Provide equipment and systems start-up as specified.
 2. Operate equipment and systems as required for initial systems operations and for final functional performance tests as they are performed by the CA, including the on-site participation of approved factory trained manufacturer's representatives for equipment.
 3. Attend commissioning meetings, and attend to action items arising from them, as required to allow the commissioning process to proceed on schedule.
 4. Provide instruction and demonstrations for the Owner's designated operating staff, in conjunction with the CA, in order to meet all specified training requirements in this regard.
 5. The Contractors shall make any and all necessary corrections to systems, equipment, O & M manuals, as built drawings, and procedures as necessary to meet the design intent, contract documents, or performance requirements if errors are discovered during the commissioning process.
 6. The Contractors shall supply all necessary documentation, such as shop drawings, submittal data, maintenance manuals, etc., required for equipment and systems to the CA for preparation of the commissioning plan, checklists, and functional performance plans.
 7. The Contractors shall provide the required names, addresses and qualifications of all specified Manufacturer's Representatives to participate in the commissioning process prior to the initial commissioning meeting.
 8. Subsequent installation and performance verifications, made necessary due to required corrections after initial verification, shall be at the respective Contractor's expense.
- C. Each Contractor shall provide to the CA three (3) copies of the following items as soon as they become available:
 1. Construction schedule, including sub-schedules and milestones for all major mechanical and electrical equipment. (i.e. boilers, motor control center, air handlers, generators, VAV boxes, etc.)
 2. Certified and approved start-up and testing reports for all subsystem equipment that comprise the System.
 3. Control schematics and sequences of operation for the total system and all subsystems.
 4. Records of required inspections for code compliance, and documentation of approved permits and licenses to operate components of the System.

5. Operating data which shall include all necessary instructions to the Owner's operating staff in order to operate the system to specified performance standards.
6. Maintenance data which shall include all necessary information required to maintain all equipment in continuous operation, such as the testing, balancing and adjusting report and the as-built drawings.
7. Written notices that building equipment and systems have been completed, tested, and are fully operational. At the discretion of the CA, this may be the completed pre-functional checklist by the contractor.
8. Checklist of all submitted contract deliverables, such as manuals, spare parts, training, documentation, etc.

1.03 COMMISSIONING TEAM MEMBERS

The members of the commissioning team consist of the CA and support staff, Project Managers (PM), and Maintenance & Operating staff, assigned members of the construction manager (CM), the design team (A/E) (particularly the mechanical / electrical engineer), Testing and Balancing Contractor (TAB), Primary trades and other installing subcontractors or suppliers of equipment (Subs).

1. Commissioning Authority
2. School Operations Staff
3. Construction Manager
4. Architectural and Engineering Design Team
5. HVAC Contractor
6. Control's Contractor
7. Testing and balancing Contractor
8. Plumbing Contractor
9. Electrical Contractor
10. Selected Equipment Manufacturers

1.04 CONSTRUCTION MANAGER'S RESPONSIBILITY

- A. Cooperate with the CA personnel, provide access to work, and provide adequate time in the work for commissioning tasks.
- B. Include the cost for commissioning requirements of construction manager in the contract price.
- C. Ensure cooperation between the subcontractors and the commissioning team
- D. Attend commissioning specific pre-construction, planning and testing meetings. Provide input into the master scheduling process with regard to the timing and duration of the commissioning activities.
- E. Work with the Owner and the CA to schedule each training session with the appropriate O&M personnel.
- F. Provide written documentation that the systems are complete and ready for functional testing verification.
- G. Correct all Contractor related deficiencies identified during any stage of the commissioning process.
- H. Furnish copies of all shop drawings, manufacturers' literature, maintenance information, or other information as may be requested.

- I. Provide qualified personnel for assistance to complete the commissioning tests, including seasonal testing.
- J. Coordinate the trades as per the CA's testing and pre-testing responsibilities.
- K. Provide training with the assistance of the CA as outlined in Divisions 23 and 26.
- L. Provide to the CA all proprietary test equipment required by manufacturers to test their equipment.
- M. Provide casual labor and facilities:
 - 1. To provide access to work to be tested.
 - 2. For CA's exclusive use, for storage of instruments and drawings, and preparation of daily reports.
- N. The CM shall provide a qualified individual to function as the MEP Coordinator to coordinate the Commissioning Program with the CA for those systems included in Divisions 23 and 26.
- O. The CM shall execute the Commissioning Program, through organization of all meetings, tests, demonstrations, training events, and performance verifications described in the Contract Documents and approved Commissioning Program. Organizational responsibilities include preparation of agendas, attendance lists, arrangements for facilities and timely notification to participants for each Commissioning event.
- P. The CM, MEP Coordinator and all Subcontractors shall review the plans and specifications with respect to the completeness in all areas relating to the Commissioning Program. This includes ensuring that there are adequate items included in the design to ensure the ability to properly test, balance, and adjust the systems and to document the performance of each piece of equipment and each system. Any items that are required for Commissioning but not shown shall be brought to the attention of the CA and Engineer of Record (ER) prior to submittal of shop drawings. Likewise, any items that are required for Commissioning but not installed shall be provided at no additional cost to the project as per design intent.
- Q. The CM shall schedule a Pre-Commissioning Coordination Meeting within 90 days of the award of the contract, at the site and at a time suitable to all parties. This Pre-Commissioning Meeting will be for the purpose of reviewing the complete Commissioning Program and establishing tentative schedules for Maintenance Orientation and inspections, O & M submittals, training sessions, system flushing and testing, job completion, system startup, and test, adjust and balance work.
- R. The CM and Coordinator will review and all functional performance tests, results, and documentation required by the contract documents, for all equipment and systems, as performed by subcontractors, vendors, etc. Develop schedules for all testing, integrate testing into the master construction activity schedule, and fully coordinate all subcontractors testing as required.
- S. The CM and Coordinator shall submit Systems Testing Documentation Forms, schedules, and other commissioning documentation using the shop drawing submittal process, for approval by the ER and CA six months prior to starting any testing required by Divisions 23 and 26. The Owner, ER and CA reserve the right to require changes in the personnel assigned at any time to maintain quality assurance within the Commissioning Program at no additional cost to the project.

- T. The CM shall coordinate directly with each subcontractor on the project specific to their responsibilities and contractual obligations. All contractors shall provide qualified personnel for participation in systems tests, including seasonal testing required after the initial testing.
- U. The CM, MEP Coordinator and all Subcontractors shall provide technical expertise to oversee, direct, and implement the correction of deficiencies found during the commissioning process. Observe the start-up and initial testing of equipment by the Contractor and Subcontractors and then all final HVAC, building automation, electrical, etc. The Contractor's personnel shall be made available to execute all aspects of the Commissioning Program until the ER and Owner accepts the final results. Commissioning Program tasks and meetings may be repeated until the ER and CA are satisfied and will not be fixed as one-time, one-chance events for the Contractor.
- V. Note any inconsistencies or deficiencies in system operations and enforce system compliance or recommend to the ER modifications to system design which will improve system performance.
- W. The CM shall coordinate through the Owner, CA and ER testing participation. When performance tests, results, and forms of documentation required by the contract documents are completed by the MEP Coordinator, the Owner, ER, and CA shall be notified. After such time, the CA will conduct systems performance verification.
- X. In the event that a performance verification test by the CA fails, the cause of failure shall be determined by the CM and rectified as soon as possible, and then re-tested.
- Y. The CM shall assemble all record drawings and all records of Code authority inspections and approvals. The CM and MEP Coordinator shall review operation and maintenance information and as-built drawings and obtain all documentation from tests and assemble a final submittal to the ER, Owner, and CA for approval. The CM shall document warranty start and dates.
- Z. The CM shall oversee and/or provide training for the systems specified in Divisions 23 and 26.

1.05 COMMISSIONING AUTHORITY'S DUTIES

- A. The CA is contracted directly with the Owner's representative.
- B. The CA shall develop and submit a detailed commissioning plan that would include all system testing requirements including, pre-functional and functional testing sheets, responsibilities, O&M manual and training requirements and forms.
- C. The CA shall execute the Commissioning Program, through organization of all meetings, tests, demonstrations, performance verification as described within.
- D. The CA shall be responsible for developing Pre-functional and Functional test procedures for all equipment and systems. Test procedures shall be in accordance with the manufacturer's recommendations, and shall fully describe the system configurations and tests for each component and system. Each test procedures shall include: specific criteria to be tested for; measured test results verses design requirements; pre-functional test sheets; approved submittal; and Contractor required testing.
- E. The CA shall develop and maintain the commissioning schedule that shall be updated during each commissioning meeting. The commissioning schedule shall be a copy of the General Contractor/Construction Manager schedule.

- F. The CA shall review all shop drawings, coordination drawings and submittals for completeness, accuracy and operational accessibility. All deficiencies shall be documented and submitted to the engineer for review.
- G. The CA shall coordinate directly with the CM during the commissioning meetings (and the subcontractors) to develop the commissioning requirements and schedules. All Contractors shall provide qualified personnel for participation in the system tests, including seasonal testing.
- H. At their discretion, the CA shall witness all Contractor required testing including; piping hydrostatic and duct leakage tests. The Contractors shall be responsible for coordinating these tests with the CA.
- I. At their discretion, the CA shall participate in any factory testing (i.e. Air-handling factory testing) as identified by the Owner. The CA shall coordinate any factory testing with the subcontractors and the CM.
- J. The CA shall review the record drawings and "as-built" documentation for clarity and accuracy. Any discrepancies identified during this review shall be documented and shall be returned for resubmission.
- K. The CA shall review, if appropriate, all operational and maintenance manuals for pre-approval prior to submission to the Engineer. Any discrepancies identified during this review shall be documented and returned to the Contractors for resubmission.
- L. The CA will perform regular construction installation inspections during the construction timetable and include any identified deficiencies in the regular commissioning meetings. These items shall be reviewed and discussed during the commissioning meeting.
- M. The CA shall participate in the TAB process and perform random sampling of air and water testing to ensure completeness of services.
- N. The CA shall work with the control's Contractor to perform a point-to-point verification of the building's automation system once the control's Contractor submits in writing that their point-to-point is complete.
- O. The CA shall cooperate with Architect and Contractor; provide qualified personnel when scheduled.
- P. The CA shall promptly notify Architect and Contractor of irregularities or deficiencies of work, which are observed during performance of services.
- Q. The CA will test all systems as defined in the Commissioning Plan and the written functional test procedures.
- R. The CA shall work directly with the Owner's Representative and Commissioning Team to provide resolution of deficiencies and provide recommendations to the team.
- S. The CA is not authorized to:
 - 1. Release, revoke, alter, or expand requirements of Contract Documents.
 - 2. Approve or accept any portion of work.
 - 3. Perform any duties of the Contractor.

1.06 SYSTEMS TO BE COMMISSIONED

- A. Steam to Hot Water Boiler
- B. Elevator

PART 2 - COMMISSIONING PROTOCOLS

2.01 PRE-FUNCTIONAL TEST SHEETS

- A. Pre-functional checklists are important to ensure that the equipment and systems are installed and started up as per the design documents and the manufacturer's start-up procedures. The CA develops the pre-functional test sheets (checklists) for each system and component to be commissioned. **The Contractor then fills out the pre-functional test sheets, and submits it for review.** The pre-functional test sheets and check-out by the CA is a parallel activity, and does not relieve the Contractors from their duties of verifying system installation and proper system start-up. The CA will share the test sheets with the Contractors for their review (if necessary). Once pre-functional test sheets are signed-off by the CA, functional performance testing may proceed without unnecessary delays. Each piece of equipment receives full pre-functional checkout by the CA. In general, the pre-functional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.
- B. Pre-functional checklists (or Testing Abstracts) are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., oil levels OK, fan belt tension, labels affixed, gages in place, sensor calibration, etc.). However, some pre-functional checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three phase pump motor of a chiller system). The word pre-functional refers to before functional testing. Pre-functional checklists augment and are combined with the manufacturer's start-up checklist.

2.02 FUNCTIONAL PERFORMANCE VERIFICATION

- A. Functional Performance Verification (FPV) is the dynamic testing of systems (rather than just individual components) under full, part and seasonal requirements. Systems are tested under various loads and control sequences, such as low cooling and heating loads, component failures, unoccupied modes, etc. The systems are run through all the control sequences of operation and components are verified to be responding as the design intent and documents. Functional performance verification shall include; testing all sequences of operations, verification of system capacity, generating simulated signals to simulate sensor values, conducting simulated conditions to tests all loads and verify system performance during all conditions of operation and verifying design intent. In addition, each system shall be tested through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part and full load). Proper responses, such as power failures, freeze conditions, low-oil pressures, equipment failures, etc., shall also be tested. The CA develops the functional test sheets and procedures in sequential written form, coordinates the testing, conducts the testing and documents the testing. Each Contractor is required to supply personnel to assist during the functional performance testing where applicable.
- B. No system, equipment or component thereof shall be tested until the Contractor and the CM has certified, in writing, that the system, equipment and / or components are complete, have been tested, adjusted and balanced and are ready for validating and performance testing. FPV is scheduled by the CA after the pre-functional testing requirements are complete and signed-off by the CM and the CA. FPV will not be conducted until a written notice of completion

by the CM confirming that the system is ready for FPV. The air balancing and water balancing must be complete and the controls must be debugged prior to the performance verification.

- C. **Deferred Testing.** The Contractor shall be available to assist in seasonal testing, tests delayed until weather or other conditions, until building construction is completed, required building occupancy or loading, or other conditions are suitable for the demonstration of equipment or system's performance, as specified. These deferred tests shall be conducted in the same manner as the seasonal tests as soon as possible. Deferred testing shall be executed, documented and deficiencies corrected as specified herein for functional performance testing. Any adjustments or corrections to the O&M manuals and "As built" documents required by the results of the testing shall be made before the seasonal testing process is considered complete.

2.03 TESTING DOCUMENTATION, NON-CONFORMANCE AND APPROVALS

- A. The CA shall clearly list any outstanding items of the initial start-up and pre-functional procedures that were not completed successfully. The testing form and any outstanding deficiencies shall be provided to the CM / Owner within two days of test completion. The CA shall review the Contractor's startup testing procedures and reports and shall submit either a non-compliance report or an approval form to the Contractor. The CA shall work with the Contractor and others as necessary, to correct and retest all cost deficiencies or uncompleted items. The Contractor shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CA as soon as outstanding items have been corrected and resubmit an updated start-up report with a Statement of Correction on the original non-compliance report. When all requirements are satisfactorily completed, the CA shall recommend approval of the startup and pre-functional testing of each system and schedule the functional testing of the equipment or system.
- B. As functional performance testing progresses and a deficiency is identified, the CA shall discuss the issue with the executing Contractor and the commissioning team.
 - 1. When there is no dispute of the deficiency and the Contractor accepts responsibility for correcting it, the CA shall document the deficiency and the Contractor's response and intentions and the testing shall proceed, if possible. Corrections of minor deficiencies identified may be made by the contractor during the functional performance testing, at the discretion of the CA. Every effort shall be made or expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the commissioning effort.
 - 2. When the identified deficiency is corrected, the Contractor shall sign the statement of correction at the bottom of the non-compliance form, certifying that the equipment is ready to be retested, and return the form to the CM. The CM shall sign the form and submit to the CA. The CA shall schedule the retest of the equipment or system involved.
 - 3. If there is a dispute about an identified deficiency, the CA shall document the deficiency and the Contractor's response, and provide a copy to the Contractor. Every attempt shall be made to resolve the dispute at the lowest management level possible. When the dispute resolution has been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and returns the form to the CA. The CA shall schedule the retest of the equipment or system involved. Final interpretive authority shall be the A/E. Final acceptance authority shall be the Owner.
- C. During the functional performance testing of multiple units of similar equipment, the CA shall test all of the equipment and components that are to be commissioned. If, under such a testing procedure, three or more, identical pieces of equipment (size alone does not constitute difference) fail to perform to the requirements of the Contract Documents (mechanically or substantively) due to manufacturing or installation defects not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the CA. In such case, the Contractor shall provide the CA with the following:

1. Within one week of notification from the CA, the Contractor or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be provided to the CA within two weeks of the original notice.
2. Within two weeks of the original notification, the Contractor shall provide the CA and the A/E a signed and dated, written explanation of the problem, cause of failures, etc. and proposed solution, including full equipment submittals for corrective or replacement equipment, if appropriate. The proposed solution shall not be for less than the specification requirements of the original installation.
3. When approved, two examples of the proposed solution shall be installed by the Contractor and the CA shall schedule and conduct functional testing of the proposed solution. Upon completion of the functional testing of the proposed solution, the CA shall recommend the acceptance or disapproval of the proposed solution to the Owner.
4. Upon acceptance of the proposed solution by the Owner, the Contractor shall replace or repair all identical items, at their expenses and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week of approval of the proposed solution.
5. Where 15% or more of a group of devices or components have failed, it shall be deemed that the entire group failed and will require retesting once the corrections have been made. The CM shall submit a letter to the CA that the corrections have been made by the Contractor and system can be retested.

D. Cost of Retesting

1. The cost for CA and/or Owner personnel to conduct the retesting of a functional performance testing requirements necessitated because a specific pre-functional or startup test item, reported to have been successfully completed, but found to be incomplete or faulty, shall be the responsibility of the Contractor.
2. For a deficiency identified during the functional testing, not related to any pre-functional checklist or start-up fault, the CA and Owner shall direct the retesting of the equipment once all deficiencies have been rectified. However, all costs for any subsequent retesting shall be the responsibility of the Contractor.
3. Items left incomplete, which later cause deficiencies or delays during functional testing may result in backcharges to the responsible party.

2.04 OPERATION AND MAINTENANCE MANUALS

- A. Each Contractor shall submit operational and maintenance manuals to the CA, through the CM, prior to training. The CA reviews the O&M manuals, documentation and redline as-builts for systems that are commissioned to verify compliance with the Specifications. The CA provides written feedback on O&M manuals to the PM. Upon successful review of the corrections, the CA shall recommend approval and acceptance of these sections. The CA also reviews each equipment warranty and verifies that all requirements to keep the warranty valid are clearly stated. This work does not supersede the Architect and Engineers responsibilities according to their contract.
- B. The O&M manuals shall be project specific, include all wiring diagrams and interconnections between trades. O&M manuals must meet at minimum the required checklist before acceptance for each component:
 1. Must be in a three-ring binder, with table of contents and tabbed sections.
 2. Building name, project title, project number, contractor name and contractor project number must appear on both the front cover and the spine of the binder.
 3. Provide a copy of the valve tag schedule at the front of the O&M manual
 4. Except for minor equipment, provide complete nameplate information at the front of the O&M. Include all data: serial numbers as well as complete motor nameplate data of corresponding equipment.

5. Provide a sheet at the beginning of the O&M listing equipment and the local supplier (with address and phone number) of that specific equipment.
6. For all equipment with warranties in excess of one-year (example VSD's), include extended warranty information in the front of the binder.
7. All information must be project specific. Do not provide generic vendor O&M manuals that cover multiple model numbers of equipment. Edit vendor O&M manuals to reflect exact equipment supplied. Cross out extraneous information not applicable to the specific equipment provided. Highlight applicable information for each piece of equipment installed.
8. For each piece of equipment, provide complete data relative to the make/model number, size, capacity data, manufacturer name and address, accessories included, etc. (i.e., provide complete information that would allow ordering the exact piece of equipment supplied). To accomplish this, include portions of the approved submittal for the piece of the equipment submitted. Do not include extraneous submittal information that does not facilitate actually ordering that piece of equipment.
9. If a piece of equipment contains multiple sub-assemblies provided by different manufacturers, include make/model number, size, capacity data, etc., to allow the ordering of the exact replacement. For example: for an air-handling unit, provide information on each coil, filter, damper, fan etc.
10. Job specific, as-built, wiring diagrams, piping diagrams, etc., must be supplied for all equipment. All external connections must be shown on these diagrams. Example #1: for VSD's, terminal strip numbers where external control signal is landed must be indicated. Example #2: A piece of equipment is supplied with controls that interface with the museum DDC system. Wiring diagram must be project specific and indicate interface with the existing DDC system.
11. For all pumps and fans, include performance curves, accessories and motor manufacturer information.
12. For all flow elements (pitot tubes, triple duty valves, circuit setters, etc.) provide all flow curves.
13. For all air-handling systems, include sound power data (normally this was included in the equipment submittal).
14. For all filters, clean and dirty filter drops must be provided.
15. For all electrical equipment sensor calibration and setup requirements must be detailed in the O&M manuals.
16. Provide a list of all manufacturer spare parts for major equipment installed.
17. Provide an approved copy of the air and water balancing reports in the O&M.
18. Provide an as-built copy of the project control drawings in the O&M, along with the installation and maintenance information on individual control components.
19. Provide a copy of the equipment vibration test report in the O&M.
20. For equipment requiring a factory start-up, a start-up report is required for the O&M.

2.05 TRAINING REQUIREMENTS

- A. Each Contractor is responsible for the training requirements. The CA shall be responsible for overseeing and approving the content of training the Owner's personnel for the equipment being commissioned. The CA will provide supplemental training if required by the Owner. Owner training and orientation on equipment and systems provided by the Contractor is accomplished in three general steps.
 1. Training Plan. After reviewing the specifications, and after interviewing facility staff, the Owner and CA document equipment for which training or orientation will be provided and designate responsible parties. This document lists, among other things, the type and number of trainees, rigor of training desired by the Owner, the primary responsible subcontractor, the trainer's company and columns for tracking training agendas. The Commissioning authority provides this form to the Contractor for reference.

2. Training Syllabus & Agendas. For each piece of equipment or system for which training is provided, the contractor shall develop a Training Syllabus and Agenda for review and approval by the Owner and CA. The syllabus and agenda includes information regarding the scope of training, intended audience, training materials, etc. The training shall include a plan for including in the training session contractors/trainers from different disciplines, when appropriate. For example, the controls contractor may be asked to provide brief training on controls in the same session with the mechanical training for equipment controlled by the building automation system. Approved syllabus and agendas shall be utilized and followed during each training session, with copies provided to each trainee.
3. Training Record. The contractor shall document the training session by means of a signed attendance sheet by both the trainer(s) and the attendees. The trainer checks off subjects covered on the Agenda. When the training is complete, the Contractor provides a copy of the training record, and the trainer's agenda to the Owner and CA. The Owner and CA review the training record and make final approval by signing it. The CA will, as appropriate, witness the training sessions. Where required by other sections of the specifications, the contractor shall video (DVD) the training session and provide to the CA and Owner the final and edited copy of the video for review and acceptance.

2.06 SCHEDULING REQUIREMENTS

- A. The As-Built drawings shall be updated to date and reviewed with the CA for approval no more than 45-days after all material is installed and in place.
- B. Testing and Start-ups schedules shall be kept up to date. Advise the CA and the Owner (in writing) with a minimum of 60 hours prior to commencement.
- C. Notify the CA and the Owner with a minimum of 2-weeks prior to the commencement of the TAB work for both the air and the hydronic systems. Follow requirements set forth in section 230800.

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 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. Buildings, grounds, paving, sidewalk, etc. shall be restored and left in a condition at least equal to that existing prior to the beginning of the work.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Asbestos and Lead Survey performed by WSP dated 1/21/2020 consisting of 50 pages. This Section includes the following:
- B. Related Sections include the following:
 - 1. Section 028200 - ASBESTOS REMEDIATION

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. Salvage of existing items to be reused or recycled.

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. Photographs or Video: Submit before Work begins.
- F. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.07 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.08 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.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.
 2. Provide a Fire Watch or other method acceptable to the authority having jurisdiction should the existing fire protection facilities have to be shut down during the work.
 3. Do not disable or disrupt building fire or life safety systems without five (5) days prior written notice to Architect.

1.09 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials 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 011000 "Summary."
- 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.

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.
 10. Interior demolition work using other than handheld equipment is subject to periodic Special Inspections per 2014 NYCDOB BC, Section 1704.20.4.
- B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.
1. Building Structure and Shell: 75 percent.
 2. Nonshell Elements: 50 percent.
 3. Nonshell Elements: 40 percent.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner or as indicated on Drawings.
 5. Protect items from damage during transport and storage.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.05 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

- B. 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. 022600 – Hazardous Material 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: Carpeting, Floor Tiles, Leveling Compounds and Mastics.
 - b. Interior: Exterior Wall Vapor Barrier in the Auditorium.
 - c. Interior: Braided Electrical Wiring.
 - d. Interior: Corrugated Heater Insulation.
 - e. Refer to construction drawings and the WSP Report located in the Appendix.
 - 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. A Site Specific Variance is anticipated for the asbestos abatement work as described in Section 1.01A to alleviate the requirement of full containment.
 - 2. The contractor shall be responsible for obtaining any site specific variances.
 - 3. No chemicals shall be utilized during the removal of mastic.

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 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 NYSDOL 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. 40 CFR 61, Subpart A, "General Provisions" (EPA)
 - 10. 40 CFR 61, Subpart M, "National Emission Standard for Asbestos" (EPA)
 - 11. 49 CFR 171-172, Transportation Standards (DOT)
 - 12. 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 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 NYSDOL.

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 staff the Project with a NYSDOL-trained and certified Project Monitor to act on the Owner's behalf at the job site. This individual shall be designated as the Abatement Project Monitor (APM).
1. The APM shall be on-site at all times the Contractor is on-site. The Contractor shall not be permitted to conduct any Work unless the APM is on-site.
 2. The APM has the authority to direct the actions of the Contractor verbally and in writing if the Contractor is not performing in compliance with the Project Documents and all regulations. Such authority does not in any way diminish the Contractor's sole responsibility to perform all Work in accordance with the Contract Documents and regulations. However, only the Owner shall have the authority to Stop Work when gross work practice deficiencies or unsafe practices are reported by the APM or when ambient fiber concentrations outside the removal area exceed 0.01 f/cc or background level, whichever is greater.
 - a. Such Stop Work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been corrected.
 - b. Standby time required to resolve the situation shall be at the Contractor's expense.
 3. The APM shall provide the following services:

- a. Inspection of the Contractor's Work, practices, and procedures, including temporary protection requirements, for compliance with all regulations and Project specifications.
 - b. Provide abatement Project air sampling as required by applicable regulations (NYS, AHERA). Sampling will include pre-abatement (backgrounds), work area preparation, during abatement and clearance sampling.
 - c. Verify daily that all Workers used in the performance of the Project are certified by the appropriate regulatory agency.
 - d. Monitor the progress of the Contractor's Work, and report any deviations from the schedule to the Owner.
 - e. Monitor, verify, and document all waste load-out operations.
 - f. Verify that the Contractor is performing personal air monitoring daily, and that results are being returned and posted at the site as required.
4. Inspections shall be conducted at various milestones as Work progresses by the APM. Additional inspections shall be conducted as required by Project conditions. Progression from one phase of work to the next by the Contractor shall be permitted only after visual inspection and verbal approval by the APM.
- E. 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 NYS 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. 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 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 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 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 removed.
- 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 NYS Department of Labor Code Rule 56 or a Project specific variance issued by the NYS Department of Labor.
- 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 Section 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 NYS Department of Labor Code Rule 56, Applicable Variance 108 (AV 108) Glovebag Operations, or a Project specific variance issued by the 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 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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Concrete toppings.

1.03 REFERENCES

- A. ACI 301 - Specifications of Structural Concrete for Buildings.
- B. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- C. ACI 308 - Standard Practice for Curing Concrete.
- D. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- E. ASTM C33 - Concrete Aggregates.
- F. ASTM C94 - Ready-Mixed Concrete.
- G. ASTM C150 - Portland Cement.
- H. ASTM C260 - Air Entraining Admixtures for concrete.
- I. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- J. ASTM C494 - Chemical Admixtures for Concrete.
- K. ASTM C618 - Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

1.04 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.05 ACTION SUBMITTALS

- A. The contractor shall comply with the requirements of Division 01 Specification of the Project Manual, Section 013300 - SUBMITTALS.
- B. Product Data: For each type of product indicated.
- C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.

2. Submit mix design mixtures for each type of concrete to be used on the Project at least 30 calendar days prior to the first scheduled concrete pour. The Contractor's testing laboratory shall develop concrete mix designs and test all materials and mixes for conformance with ACI 301 and these specifications. The costs associated with development of the design mix and testing of samples shall be included in the bid price.
3. Submit the following:
 - a. Name, address, and telephone number of Contractor's laboratory.
 - b. Mix proportions.
 - c. Source of cement, type, brand, and certified copies of mill reports, including physical and chemical analysis.
 - d. Sources of fine aggregates and results of test made in accordance with ASTM C33 and ASTM C40.
 - e. Source of coarse aggregates and results of tests made in accordance with ASTM C33.
 - f. Catalog cuts of all admixtures.
 - g. Furnish test results of slump, air entrainment and water-cement ratio for each mix design.
4. If adopted mix fails to produce concrete meeting the requirements for strength and placibility, the Architect may order additional cement or adjustments to mix proportions at no extra cost to the Owner.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Material Certificates: For each of the following, provided by manufacturers:
 1. Cementitious materials.
 2. Admixtures.
 3. Form materials and form-release agents.
 4. Steel reinforcement and accessories.
 5. Curing compounds.
 6. Bonding agents.
 7. Semi rigid joint filler.
 8. Joint-filler strips.
 9. Repair materials.
- C. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- D. Field quality-control reports.
- E. Minutes of preinstallation conference.
- F. Furnish transit-mix delivery slips to Owner's Representative.

1.07 QUALITY ASSURANCE

- A. Comply with Referenced Standards specified in Division 01 Section "References" in addition to ACI 301.
- B. Perform testing under the provisions of Division 01 Section "Quality Requirements" and the "FIELD QUALITY CONTROL" Article of Part 3 listed in this specification.
- C. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

- D. **Manufacturer Qualifications:** A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- E. **Testing Agency Qualifications:** An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing indicated.
1. The contractor shall provide an adequately sized, insulated curing box to house concrete cylinders at the discretion of the Architect, for the 48-hour period between concrete pour and sample collection pick-up by the Testing Laboratory (ASTM C31/C31M). As directed by the Architect, the contractor shall cure additional cylinders in the same fashion as the in-place concrete.
 2. Curing box shall be located away from the main construction area and shall be blocked up off the ground.
 3. A log sheet shall be provided in a waterproof sheet protector to log in the placement and removal of the concrete test samples by the testing laboratory.
 4. Minimum information to be logged for each pour date shall include: date of pour, date of pick-up, weather conditions at the time of pour, testing
- F. **Source Limitations:** Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer. To further insure consistency, coloration, finish and quality; all aggregates, cement, water and other ingredients shall each be secured from the same source for the duration of the project.
1. The batching plant and raw materials may be subject to inspections and test performed by the Architect.
- G. **ACI Publications:** Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specifications for Structural Concrete", Sections 1 through 5.
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials".
 3. ACI 304 - "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
- H. **Concrete Testing Service:** Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- I. **Preinstallation Conference:** Conduct conference at Project site.
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 2. Review special inspection and testing and inspecting agency procedures for field quality control, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.
- B. Store cement off the ground in a dry, weatherproof, adequately ventilated structure with provisions to prevent the absorption of water.
- C. Transport dry concrete batches from the central plant to the site in approved truck mixers conforming to the requirements of the Truck Mixer Manufacturer's Agitating Standards. Each truck shall contain a plate stating the capacity, drum speeds and be provided with a revolution counter.
- D. Packaged material shall be delivered and stored in the original packages until ready for use. Packages or materials showing evidence of water or other damage shall be rejected.
- E. Protect all materials from freezing.

1.09 COORDINATION

- A. Coordinate work under provisions of Division 01 Specification of this Project Manual.
- B. The Contractor shall provide at least five (5) working days advance notice prior to formwork closure to the Architect.
- C. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.
- D. Notify Architect a minimum of three (3) working days prior to commencement concrete pours.

1.10 REGULATORY REQUIREMENTS

- A. Conform to ACI 304R and all applicable codes for placement of concrete and related work.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when the ambient temperature is below 40 deg. F. or when the concrete temperature exceeds 85 deg. F. Under certain circumstances, the Engineer may approve the placement of concrete under the above conditions, provided that the procedures of ACI 305R and ACI 306R are strictly adhered to.
- B. Do not place concrete when the conditions may adversely affect the placing, curing or finishing of concrete, or its strength.
- C. Comply with the requirements contained in Section 016500 - PRODUCT DELIVERY, STORAGE AND HANDLING.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.

2. Steel forms: Minimum 16 gage thick, stiffened to support weight of concrete with minimum deflection.
3. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. Douglas Fir Species, solid one side grade and sound
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum unless indicated otherwise on the drawings.
- D. Form-Release Agent: Commercially formulated, colorless, water based, non-toxic, V.O.C. compliant, environmentally safe material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete; manufactured by DAYTON SUPERIOR or equal. Agent shall not be detrimental to the environment.
 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2.02 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.
- B. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.
- C. Steel Bar Mats: ASTM A184/A184M, fabricated from ASTM A615/A615M, Grade 60 ; ASTM A706/A706M, deformed bars, assembled with clips.
- D. Deformed-Steel Wire: ASTM A 496.
- E. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.03 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
 2. Provide load bearing pad on bottom to prevent vapor barrier puncture.

2.04 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 1. Portland Cement: ASTM C150/C150M, Type IA, gray. Supplement with the following:
 2. Silica Fume: ASTM C1240, amorphous silica.
 3. Normal-Weight Aggregates: ASTM C33/C33M, No. 57 or 67 crushed stone coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

- a. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
- b. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
4. Lightweight Aggregate: ASTM C330/C330M, 3/4 inch, nominal maximum aggregate size.
5. Water: ASTM C94/C94M, clean and not detrimental to concrete.

2.05 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C260/C260M.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 2. Retarding Admixture: ASTM C494/C494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.06 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 8 oz. /sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet weighing approximately 8 oz. / sq. yd. bonded to prevent separation during use.
- C. Membrane curing compound: Moisture Retention complying with ASTM C309. Products: EUCOCURE VOX by Euclid Chemical Company or equal.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.
 1. Products: Eucocure VOX as manufactured by Euclid Chemical Company or approved equal.

2.07 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, 1/2" asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C1059/C1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: three-component, solvent-free, moisture tolerant, epoxy modified cementitious product.
 1. Product: Armatec 110 EpoCem as manufactured by Sika Corporation or specifically approved equal.
 2. Types I and II, non-load bearing Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- D. Non-Shrink Grout: Premixed compound, free of chlorides, with non-metallic aggregate, cement water reducing and plasticizing agents; capable of minimum compressive strength of 2400 psi at 48 hours and 7000 psi at 28 days. Grout shall be suitable for contact with potable water. For

equipment bases and pipe supports, use non-shrink grout by Master Builders, Embeco 636, Unisorb V-1 or equal.

- E. Reglets: Fabricate reglets of galvanized-steel sheet not less than 26 gauge material; in the longest lengths possible with alignment splines for joints; secure to formwork; Type CO as manufactured by Fry Reglet or approved equal. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

2.08 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C150/C150M, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C109/C109M.

2.09 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
 - 2. Combined Fly Ash and Pozzolan: 25 percent.
 - 3. Ground Granulated Blast-Furnace Slag: 50 percent.
 - 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent Portland cement minimum, with fly ash or Pozzolan not exceeding 25 percent.
 - 5. Silica Fume: 10 percent.
 - 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 - 7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 - 8. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: Pier, Mat and Spread Footings; foundation walls, slab on grade and slab on metal deck: 4000 psi at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.50 for all concrete building elements.
 3. Slump Limits (Conventional Mix):
 - a. Slabs: 3 inches plus or minus one inch.
 - b. Piers, Foundation Walls and Footings: 4 inches plus or minus one inch.
 4. Slump Limits (Pump Mix):
 - a. Final slump (Slabs): 6 1/2 inches plus or minus one inch.
 - b. Final Slump (Foundation, walls and footings): 7 1/2 inches plus or minus one inch
 5. Air Content:
 - a. Piers, Mats and Spread Footings: 5.5 percent, plus or minus 1.0 percent. at the point of delivery.
 - b. Slabs: 3 percent, plus or minus 1.0 percent at point of delivery. Do not allow air content of trowel finished concrete floors to exceed 3 percent.
 6. Large Aggregates: 3/4" crushed stone; ASTM C33/C33M, No. 67.
 7. Use Admixtures only when approved by the Engineer.
 8. Mix Grout in accordance with the manufacturer's instructions and specifications.
- B. All concrete for the clear-well and backwash waste tank construction shall include Krystol Internal Membrane (KIM)® integral water repellent admixture as manufactured by Kryton or specifically approved equal. Admixture shall be added at a rate as recommended by the approved manufacturer.

2.11 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M and ASTM C1116/C1116M, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and measurements before proceeding with formwork. Ensure that dimensions agree with the plans.
- B. Inspect the formwork and reinforcing that it has been properly set and secured and that all items to be embedded, built-in or pass through concrete are at their proper locations and elevations.

- C. The General Construction Contractor shall verify that all other prime contractors have installed concrete inserts, sleeves, and embedded elements of the project, such as conduit, and their work has been totally completed and inspected by the Architect.
- D. Ensure that all points of contact with new grout are free from oil, grease and scale.

3.02 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 - 2. Class B, 1/4 inch for rough-formed finished surfaces.
 - a. Hand trim sides and bottom of earth forms and remove loose soil to the satisfaction of the Architect.
 - b. Remove water from forms and excavations and divert water flow to avoid washing over, under or through freshly placed concrete.
- D. Construct forms tight enough to prevent loss of concrete mortar. Align form joints.
- E. Do not apply form release agent where concrete surfaces are to receive special finishes or applied coatings that may be affected by the agent.
- F. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- I. Chamfer: Provide 3/4" inch chamfer on all exterior horizontal and vertical corners and edges of permanently exposed concrete.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement. Do not apply form release agent where concrete surfaces are to receive special finishes or applied coatings that may be affected by the agent.

- M. Where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack with non-metallic/ non-shrink grout.
- N. Prepare previously placed concrete by cleaning with steel brush and apply a Bonding Agent in accordance with the manufacturer's specifications and instructions.

3.03 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.
 - 4. Ensure that all inserts and embedded items are not disturbed during concrete placement.

3.04 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

3.05 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars. Use reinforcing splices at minimum of locations and only at locations of minimum stress. Review locations of splices with Architect. Splice locations shall be approved during shop drawing review phase. Rebar splice overlap shall be the minimum length as per ACI 318.
 - 1. Weld reinforcing bars according to AWS D1.4/D1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- F. Take necessary measures to ensure that reinforcement is not disturbed during the placement of concrete.

3.06 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls as indicated or at 20' o.c. maximum. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction / Control Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 3/16"-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Ensure joint fillers and devices are not disturbed during placement of concrete.
- F. Install all joint fillers and devices in accordance with the manufacturer's instructions and specifications for floor and wall finish.
- G. Install joint device anchors. Maintain correct position to allow joint cover flush with floor and wall finish.
- H. Install joint covers in one-piece length when adjacent construction activity is complete.
- I. Apply sealants in joint devices in accordance with the manufacturer's specifications and instructions.

3.07 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
 - 2. Place concrete with the aid of mechanical vibrators which are capable of transmitting to the concrete not less than 3,000 impulses per minute. Maintain at least three (3) vibrators in good working condition, ready for use when concrete placement begins in any one area.
 - 3. Do not interrupt successive placement. Do not permit cold joints to occur.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and ACI 305R and as follows:
 - 1. Maintain concrete temperature below 95 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3. Maintain records of concrete placement. Record date, locations, quantity, air temperature and test samples taken.
4. In areas with floor drains, maintain floor elevations at walls; pitch surfaces uniformly to the drains maintaining a 1% slope.
5. Cure floor surfaces in accordance with ACI 308R.
6. Apply curing compound in accordance with the manufacturer's specifications and instructions in two (2) coats with the second coat at right angles to the first.

3.08 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces exposed to public view.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.09 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch 6 mm in one direction.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
 1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, and ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish surfaces to the following tolerances, according to ASTM E1155, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F (F) 30; and of levelness, F (L) 20; with minimum local values of flatness, F (F) 24; and of levelness, F (L) 15; for suspended slabs.
 3. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
- E. Slip-Resistive Finish: Before final floating, apply slip-resistive finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
1. Uniformly spread 25 lb. /100 sq. ft. of dampened slip-resistive over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
 2. After broadcasting and tamping, apply float finish.
 3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aluminum granules.
- F. Finish exposed concrete as specified in Division 09 specifications of this project manual.

3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. All exposed horizontal and vertical wall and slab corners shall have a 3/4" wide chamfered edge.
- C. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Construct concrete bases 6 inches high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 3. Minimum Compressive Strength: 4000 psi at 28 days.
 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 12 inch centers around the full perimeter of concrete base.
 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
 6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 7. Cast anchor-bolt inserts into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.
- D. Grout: Install grout in accordance with the manufacturer's specifications and instructions. Moisten concrete and grout surfaces and allow drying until damp. Remove all standing water. Pump or inject grout into tight spaces to ensure intimate contact with the existing grout. Cure grout with an appropriate membrane in accordance with the manufacturer's specifications and instructions.

3.11 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 and ACI 305R for hot-weather protection during curing.

- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308R and ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
- F. Liquid sealer/hardener to be applied on exposed concrete cured with moisture retentive or absorptive covers. The following materials provide varying levels of protection, sealant and hardness. Review products for project appropriateness.
 - 1. Euclid: Euco Diamond Hard (Liquid Sealer and Hardener)
 - 2. L&M Construction Chemicals: Seal Hard (Liquid Sealer and Hardener)
 - 3. Curecrete Chemical Company: Ashford Formula (Liquid Sealer and Hardener)
 - 4. Midwest Floor Care: Structure Formula (Liquid Sealer and Hardener)
 - 5. Or approved equal.

3.12 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least three month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semi rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.
- B. Immediately remove all rust spots that have developed during the construction period as soon as directed by the Architect. Remove all rust spots that have formed by the use of temporary handrails.

3.14 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and/or qualified testing and inspecting agency to perform field tests and inspections and prepare test reports. Contractor is responsible to notify the Owners representative at least 72 hours prior to the scheduled work that requires inspection / testing. The presence of the Inspector engaged by the Owner does not relieve the contractor of Quality Control Requirements.
- B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 1. Steel reinforcement placement.
 2. Headed bolts and studs.
 3. Steel reinforcement welding.
 4. Concrete placement, including conveying and depositing.
 5. Curing procedures and maintenance of curing temperature.
 6. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C172/C172M shall be performed according to the following requirements:
 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - a. Frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - b. One (1) additional test cylinder shall be taken during cold weather and be cured under the same conditions as the concrete it represents.
 2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C173/C173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 6. Compression Test Specimens: ASTM C31/C31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two Insert number sets of two standard cylinder specimens for each composite sample.
 7. Compressive-Strength Tests: ASTM C39/C39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7 and 28-day tests.
 11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
 13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E1155 within 72 hours of finishing.

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 cast-in-place concrete, concrete base units and equipment pads including reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
 - 3. Design Mixtures for Credit ID 1.1: For each concrete mixture containing fly ash as a replacement for portland cement or other portland cement replacements. For each design mixture submitted, include an equivalent concrete mixture that does not contain portland cement replacements, to determine amount of portland cement replaced.
- C. Design mixtures: For each concrete mixture.

1.04 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment

PART 2 - PRODUCTS

2.01 CONCRETE, GENERAL

- A. Comply with the following sections of ACI 301 unless modified by requirements in the Contract Documents:
 - 1. "General Requirements."
 - 2. "Formwork and Formwork Accessories."
 - 3. "Reinforcement and Reinforcement Supports."
 - 4. "Concrete Mixtures."
 - 5. "Handling, Placing, and Constructing."
 - 6. "Lightweight Concrete."
- B. Comply with ACI 117 (ACI 117M).

2.02 STEEL REINFORCEMENT

- A. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

2.03 CONCRETE MATERIALS

- A. Regional Materials: Concrete shall be manufactured within 500 miles (800 km) of Project site from aggregates[and cementitious materials] that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- C. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I.
 - 2. Fly Ash: ASTM C 618, Class C or F.
- D. Normal-Weight Aggregate: ASTM C 33/C 33M, 1-1/2 inch (38 mm) nominal maximum aggregate size.
- E. Lightweight Aggregate: ASTM C 330/C 330M, _____ inch nominal maximum aggregate size.
- F. Air-Entraining Admixture: ASTM C 260/C 260M.
- G. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
- H. Water: ASTM C 94/C 94M.

2.04 RELATED MATERIALS

- A. Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick; or plastic sheet, ASTM E 1745, Class C.
- B. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.05 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- B. Water: Potable.

2.06 CONCRETE MIXTURES

- A. Comply with ACI 301 (ACI 301M).
- B. Normal-Weight Concrete:
 - 1. Minimum Compressive Strength: 4500 psi (31 MPa) at 28 days.
 - 2. Maximum W/C Ratio: 0.50.
 - 3. Slump Limit: 4 inches (100 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
 - 4. Air Content: Maintain within range permitted by ACI 301 (ACI 301M). Do not allow air content of trowel-finished floor slabs to exceed 3 percent.

2.07 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116, and furnish batch ticket information.
 - 1. When air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 FORMWORK INSTALLATION

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301 (ACI 301M).

3.02 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.03 VAPOR-RETARDER INSTALLATION

- A. Install, protect, and repair vapor retarders according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.
 - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended adhesive or joint tape.

3.04 STEEL REINFORCEMENT INSTALLATION

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.05 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

3.06 CONCRETE PLACEMENT

- A. Comply with ACI 301 (ACI 301M) for placing concrete.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).
- C. Do not add water to concrete during delivery, at Project site, or during placement.
- D. Consolidate concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
- E. Equipment Bases and Foundations:
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases 4 inches (100 mm) high unless otherwise indicated; and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: 5000 psi (34.5 MPa) at 28 days.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
 - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor them into structural concrete substrate.
 - 6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.07 FINISHING FORMED SURFACES

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch (3 mm).
 - 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- B. Rubbed Finish: Apply the following rubbed finish, defined in ACI 301 (ACI 301M), to smooth-formed-finished as-cast concrete where indicated:
 - 1. Smooth-rubbed finish.
 - 2. Grout-cleaned finish.
 - 3. Cork-floated finish.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.08 FINISHING UNFORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.
 - 1. Do not further disturb surfaces before starting finishing operations.

- C. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, fluid-applied or direct-to-deck-applied membrane roofing, or sand-bed terrazzo.
- D. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset methods. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
- E. Slip-Resistive Broom Finish: Apply a slip-resistive finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.09 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 (ACI 301M) for hot-weather protection during curing.
- B. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- C. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests: Perform according to ACI 301 (ACI 301M).
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.

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. Steel reinforcing bars.
 - 4. Masonry joint reinforcement.
 - 5. Ties and anchors.
 - 6. Miscellaneous masonry accessories.
 - 7. Installation of Door Frames, Lintels and items furnished by other sections.
 - 8. Cleaning of masonry.

1.03 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

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 TMS 402/602/ASCE 6/TMS 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. 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. Reinforcing bars.
 - 6. Joint reinforcement.
 - 7. 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 C 1506 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.

1.08 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.
- B. Special Testing Inspections: Owner shall employ a Special Inspection Agency to provide required inspections in accordance with current NYS IBC Section 1704.5 and 1704.5.1 (Level 1).
- C. 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.

- D. 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.
- E. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 402/602 unless modified by requirements in the Contract Documents.

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.

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. 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 (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
 - 4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
 - 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. 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.
- H. Grout: ASTM C476. 2,000 psi minimum
 - 1. Fine aggregate: sand.
 - 2. Coarse aggregate: 3/8" chip gravel
- I. Aggregate for Grout: ASTM C404.
- J. 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.
- K. Water: Potable.

2.04 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60 (Grade 420).
- B. Epoxy coated reinforcement shall conform to ASTM A775/A775M.
- C. Masonry Joint Reinforcement, General: ASTM A951/A951M.
 - 1. Interior Walls: Mill- galvanized, carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized, carbon steel.
 - 3. Wire Size for Side Rods: 0.187-inch diameter.
 - 4. Wire Size for Cross Rods: 0.148-inch diameter.
 - 5. Wire Size for Veneer Ties: 0.187-inch diameter.
 - 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 - 7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.
- D. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.05 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 A 82/A 82M; with ASTM A153/A153M, Class B-2 coating.
 - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.

3. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- B. 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. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch diameter, hot-dip galvanized steel wire.
 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.187-inch diameter, hot-dip galvanized steel wire.
- C. Partition Top anchors: PTA type, Model 420 by Hohmann & Barnard, Inc. or approved equal, 0.105-inch thick metal plate with 3/8-inch diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- D. Rigid Anchors for intersecting walls: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.
 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A153/A153M.

2.06 MISCELLANEOUS ANCHORS

- A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.
- B. 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.
- C. 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.

2.07 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. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).
- D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

- 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.

2.08 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 078446 - FIRE-RESISTIVE JOINT SYSTEMS.

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 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.07 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.

3.08 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
 - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block.
 - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.

4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.
- C. Control Joint Locations:
1. At major changes in wall height.
 2. At changes in wall thickness.
 3. At control joints in foundations, roofs and floors.
 4. At chases and recesses for piping, columns, fixtures, etc.
 5. At one side of wall openings less than 6 feet unless indicated otherwise.
 6. At both sides of wall opening exceeding 6 feet.
 7. At or near wall intersections.
 8. Near return wall angles in L, T, and U shaped structures.
 9. All other cases, maximum spacing between joints shall not exceed 30 feet.

3.09 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.
- D. Steel reinforcement bars, unless otherwise detailed on plans, shall be placed as follows:
1. Install #5 bar, vertically at all corners and at door and window jambs and 32" o.c. typical in all 10" walls.
 2. Install #5 bar, vertically at all corners and at door and window jambs and 48" o.c. typical in all 12" walls.
 3. Fill all concrete masonry unit cells containing reinforcement bars solid with mortar.
 4. Remove pre-molded insulation from block cores containing vertical reinforcing bars.
 5. Reinforcement Bars shall be lapped at splices as follows:

Bar Size	Min. Lap Distance
#4	24 inches
#5	30 inches
#6	36 inches
#7	42 inches

3.10 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 (IBC).
 - 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 C 780.
- 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.

3.11 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.

3.12 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. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with 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.

3.13 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 312000 - EARTH MOVING.
 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. Structural steel.
 - 2. Grout.
 - 3. Base Plates
- B. Related Requirements:
 - 1. Division 01- "Quality Requirements" for independent testing agency procedures and administrative requirements.
 - 2. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame not defined as structural steel.

1.03 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.
- C. Heavy Sections: Rolled and built-up sections as follows:
 - 1. Shapes included in ASTM A6/A6M with flanges thicker than 1-1/2 inches (38 mm).
 - 2. Welded built-up members with plates thicker than 2 inches (50 mm).
 - 3. Column base plates thicker than 2 inches (50 mm).

1.04 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 anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.05 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.06 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Shop drawings and required calculations shall bear the seal and signature of a registered Professional Engineer licensed in the state in which the project is located. Structural steel shop drawings will not be reviewed without said seal and signature.

- a. A full set of engineered calculations for all beam to column moment connections shall be submitted to the engineer of record for approval. The steel fabricator drawings shall not be reviewed without said engineering calculations affixed with a seal and signature of a professional engineer licensed in the state in which the project is located.
 2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 3. Include embedment Drawings.
 4. Indicate profiles, sizes, spacing and locations of structural members, openings, attachments, fasteners, connections, cambers, holes and other pertinent data. Include locations of structural members, openings, attachments and loads.
 5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
 7. For structural steel connections indicated to comply with design loads, include structural design data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.07 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installer / fabricator.
- B. Welding certificates: Submit certificates certifying that welders employed in the work have met AWS qualifications within in the previous 12 months.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties. Indicate structural strength, destructive and non-destructive test analysis.
- E. Product Test Reports: For the following:
 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 2. Direct-tension indicators.
 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 4. Shear stud connectors.
 5. Shop primers.
 6. Non-shrink grout.

1.08 QUALITY ASSURANCE

- A. Fabricator shall have a minimum of five (5) years documented experience with performing the work of this section.
- B. Installer Qualifications: A qualified installer specializing in performing the work of this section with a minimum of three (3) years of documented experience.
- C. Delegated Connection Designer: Connections not fully detailed on the contract drawings shall be designed under the direct supervision of a professional structural engineer experienced in the design of this work and licensed in the state in which the work is located. The shop drawings shall bear the seal and signature of same professional engineer.

- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- E. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC Code of Standard Practice for Steel Buildings and Bridges - AISC 303.
 - 2. AISC Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings - AISC 360.
 - 3. RCSC's "Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts."

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products to/at the site under the supervision of Division 01 of this Project Manual.
- B. Schedule deliveries of materials to the site at intervals which will ensure uninterrupted progress of the work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- D. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and experience. who bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F1852 fasteners and for retesting fasteners after lubrication.

1.10 COORDINATION

- A. Coordinate the work under Division 01 specification of this Project Manual.
- B. Coordinate the selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturer's recommendations to ensure that shop primers and topcoats are compatible with one another.
- C. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions and directions for installation.
- D. Coordinate the work of this section with utility installations and all other adjacent work.
- E. Coordinate the work of this section such that general progress of the Work is not interrupted.

1.11 FIELD MEASUREMENTS

- A. Verify that field measurements are as shown on the plans and approved shop drawings.

- B. The contractor is responsible for the proper location and elevations of the work.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated where beam end reactions are not shown on drawings. Connection designer shall design shear connections to resist the reaction resulting from the maximum allowable uniform load of the beam found in the AISC Specification being applied along its full length.
 - 1. Select and complete connections using AISC 360.
 - 2. Use Load and Resistance Factor Design; data are given at factored-load level.
- B. Moment Connections: Type FR, fully restrained. Provide design and details of moment connections to resist forces shown on the contract drawings.
- C. Construction: Combined system of moment frame and braced frame.

2.02 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. W-Shapes: ASTM A 992/A 992M.
- C. Channels, Angles, M-Shapes: ASTM A 36/A 36M.
- D. Plate and Bar: ASTM A 36/A 36M.
- E. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade C, seamless structural tubing.
- F. Welding Electrodes: Comply with AWS requirements.

2.03 BOLTS, CONNECTORS, AND ANCHORS

- A. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip zinc coating.
 - 2. Direct-Tension Indicators: ASTM F959/F959M, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A490 (A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, (ASTM A563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers with plain finish.

1. Direct-Tension Indicators: ASTM F959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.
- D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F1852, Type 1, round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 1. Finish: Plain.
- E. Shear Connectors: ASTM A108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- F. Anchor Bolts: ASTM A307, Grade C for non-moment resisting anchor rods. ASTM F1554, 36 and 55 ksi yield strength for moment resisting anchor rods.
 1. Nuts: ASTM A563 heavy-hex carbon steel.
 2. Plate Washers: ASTM A36/A36M carbon steel.
 3. Washers: ASTM F436/F436M, Type 1, hardened carbon steel.
 4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- G. Threaded Rods: ASTM A 36/A 36M.
 1. Nuts: ASTM A563 ASTM A563M heavy-hex carbon steel.
 2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
 3. Finish: Plain.
- H. Clevises: Made from cold-finished carbon steel bars, ASTM A108, Grade 1035.
- I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A108, Grade 1030.
- J. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A108, Grade 1018.

2.04 PRIMER

- A. Primer: Comply with Division 09
- B. Primer: SSPC-Paint 15, Type I, red oxide.
- C. Ensure primer is compatible with required topcoat.

2.05 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Grout shall consist of a premixed compound with cement, water reducing and plasticizing additives capable of developing a minimum compressive strength of 7000 psi at 28 days.

2.06 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
 1. Camber structural-steel members where indicated.
 2. Fabricate beams with rolling camber up.
 3. Identify high-strength structural steel according to ASTM A6/A6M and maintain markings until structural steel has been erected.
 4. Mark and match-mark materials for field assembly.

5. All wide flange structural steel members shall be fabricated in accordance with ASTM A992/A992M. All miscellaneous steel members including channels, angles, S, HP, and M shapes shall be fabricated in accordance with ASTM A36/A36M.
 6. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
 7. All shop connections shall be welded or high strength bolted.
 8. Bearing surfaces shall be planed true to provide full bearing over the entire surface.
 9. Continuously seal joined members by intermittent welds and plastic filler. Grind welds smooth where exposed or where interference with other building materials is encountered.
 10. Splicing is not permitted unless indicated on the Contract Documents or accepted on the final approved Shop Drawings.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces. Mechanically thermal cut bolt holes shall not be permitted unless prior approval by the Architect is obtained in writing.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning." or SSPC-SP 3, "Power Tool Cleaning." unless a more stringent cleaning method is required for selected primers and / or other coatings.
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- G. Shop prime non-exposed steel members after fabrication in accordance with SSPC- PA. Do not prime surfaces that will be fireproofed, field welded or are in contact with concrete or high strength bolts.
- H. Paint exposed structural steel members in accordance with the applicable Division 09 Specification section.
- I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning unless approved by the Architect in writing.
 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.07 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM F3125/F3125M, Grade A325 or Grade A490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened unless otherwise shown on the contract documents or required by the connection designer.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.08 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 2. Surfaces to be field welded.
 3. Surfaces of high-strength bolted, slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 1. SSPC-SP 2, "Hand Tool Cleaning."
 2. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Prepare steel and apply a one-coat, drawings primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.09 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
 1. Inspection and Tests will not relieve the contractor of responsibility for providing materials, fabrication and erection procedures in compliance with the specified requirements. The contractor shall verify that all materials meet or exceed the requirements specified in these specifications, Contract drawings and related references. Materials not in compliance with the specified requirements will be rejected and required to be removed from the site.
- C. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM F3125/F3125M, Grade A325 or Grade A490 Bolts."
- D. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M type required for materials being welded and the following inspection procedures, at testing agency's option:
 1. Liquid Penetrant Inspection: ASTM E165/E165M.
 2. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.

3. Ultrasonic Inspection: ASTM E164.
 4. Radiographic Inspection: ASTM E94.
- E. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other drawings for compliance with requirements.
1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other drawings showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of installation will indicate that the erector accepts the conditions which exist.

3.02 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.
 2. Clean bearing surfaces and other surfaces which will be in permanent contact with the work.

3.03 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Proceed with the installation only after unsatisfactory conditions have been corrected. Commencement of installation will indicate that the erector accepts the conditions which exist.
- C. Allow for erection loads and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of permanent bracing.
- D. Coordinate placement of anchors in concrete or masonry construction for securing bearing plates.
- E. Erect all components in accordance with the approved shop drawings.
- F. Field weld components and shear studs as indicated on approved shop drawings and in accordance with AWS D1.1/D1.1M.
- G. Do not field cut or alter structural members without written approval of the Engineer.

- H. Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten Pretension anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
 - 5. Coordinate placement of anchors in concrete or masonry construction for securing base plates.
- I. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- J. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- K. Splice members only where indicated.
- L. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- M. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- N. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- O. Erect all components in accordance with approved shop drawings. After erection, prime welds, abrasions and surfaces not shop primed or galvanized as required, except surfaces to be in contact with concrete.
- P. Field weld components and shear studs as indicated on the approved shop drawings and in accordance with AWS D1.1/D1.1M.

3.04 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM F3125/F3125M, Grade A325 or Grade A490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened Pretensioned unless specifically identified as pretensioned or slip-critical on the contract documents or calculations by the Delegated Connection designer.

- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.
 - 4. Connections and abrasions shall be cleaned, prepared and finished in the same manner and with the same materials used in shop finishing.

3.05 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect and test high strength bolted connections according to RCSC's "Specification for Structural Joints Using ASTM F3125/F3125M, Grade A325 or Grade A490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165/E165M.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E164.
 - d. Radiographic Inspection: ASTM E94.
- E. Post Installed Mechanical Anchors, Adhesive Anchors and Screw Anchors: Comply with 2020 New York State Building Code Table 1705.3.
 - 1. The special inspection shall include the verification of compliance with approved construction documents and standards established by the Commissioner pursuant to Section 28-113.2.2 of the Administrative Code.
- F. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.
- G. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.06 TOLERANCES

- A. All members shall be installed within AISC tolerances and as follows:
 - 1. Maximum variation from plumb: 1/4" (6mm) per story, non-cumulative.

2. Maximum offset from true alignment: 1/4" (6mm).

3.07 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A780/A780M.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 1. Clean and prepare surfaces by SSSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- D. Touchup Priming: Cleaning and touchup priming as specified in Division 9 "High-Performance Coatings" or compatible primer established at the fabricators shop to be compatible with the final finish.

3.08 ADJUSTING

- A. All misfits due to errors in location, fabrication, inaccuracies in the setting of anchor bolts or other items of attachment or support shall be immediately reported to the Engineer and corrected in a manner subject to the approval of the Engineer.
- B. Submit method of correction to the Architect under Division 01 Specification provisions.
- C. Proceed with corrective work only after receiving written approval from the Architect.
- D. All corrections shall be made at no additional cost to the Owner.

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. Pitched Roof Rafters.
 - 2. Exterior stud wall framing.
 - 3. Flat ceiling and attic floor joist framing.
 - 4. Collar ties.

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 2020 Building Code of New York State.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Vertical deflection clips.
 - 6. Horizontal drift deflection clips
 - 7. Miscellaneous structural clips and accessories.
- D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E329 to conduct the testing indicated.
- B. 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.
- C. 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."
- D. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- E. 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."

1.06 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. Dietrich Metal Framing ; a Worthington Industries Company
 - 2. MarinoWARE
 - 3. Or approved equal.

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 A 1003/A 1003M, 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 G-60 coating.
- G. Minimum steel gauges shall be 18 ga. 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 ga..
- 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 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- 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.

2.05 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 E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.
- G. Column Flange Grip Clips: Pre-manufactured Column/Beam connectors for rapid installation of board type materials to Steel Column and Beam Flanges. ASTM A1003 A1003/A1003M Structural Grade 33 (230) Type H, ST33H (ST230H): 33ksi (230MPa) minimum yield strength, 45ksi (310MPa) minimum tensile strength, 27mil minimum thickness (22 gauge, 0.0283" design thickness) with ASTM A653/A653M G60 (Z180) hot dipped galvanized coating. Manufacturer: The steel Network, Inc. Unit connection box measures 1 inch deep, 2 inches wide and 2 1/2 inches long with a spring clip depth of 2.375 inches and a curved clip spring clearance of .2 inches.
 1. Install as indicated on the drawings. Maximum spacing 24" on center.

2.06 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.

2.07 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. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. 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 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 1. Stud Spacing: 16 inches unless indicated otherwise.
- C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 1. Install single-leg deflection tracks and anchor to building structure.
 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 3. Connect vertical deflection clips to infill studs and anchor to building structure.
 4. Connect drift clips to cold formed metal framing and anchor to building structure

- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - a. Install solid blocking at centers indicated on Shop Drawings.
 - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.05 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. All members shall be checked for proper alignment, bearing, completeness of attachments, proper placement and reinforcing.
- D. Testing agency will report test results promptly and in writing to Contractor and Architect.
- E. Remove and replace work where test results indicate that it does not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.06 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 A 780 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.

3.07 TOLERANCES

- A. Vertical alignment (plumbness) of studs shall be within 1/8 inch in 10.0 inches (3.175 mm in 3.048 m) of the span.
- B. Horizontal alignment (levelness) of walls shall be within 1/8 inch in 10.0 inches 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. 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. Product Data: For the following:
 - 1. Grout.
- B. 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. 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.

2.02 FASTENERS

- A. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A653/A653M; and, where indicated, flat washers.
- B. 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.
- C. Plain Washers: Round, ASME B18.22.1.
- D. 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.

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. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- G. 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. Galvanize miscellaneous framing and supports where indicated.

2.06 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.).

2.07 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.

2.08 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 PROTECTION

- A. Protect installed products until completion of project.

3.05 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. Stainless Steel 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. Steel: 72 percent of minimum yield strength.
- 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. 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 and welded railings.
 - 2. Railing brackets.
 - 3. Top rail support designed for connection of Hardwood Top Rail to match existing.
- 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 D1.1/D1.1M, "Structural Welding Code - Steel."

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 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.
- B. 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. Stainless Steel Pipe and Tube Railings:
 - a. AGS Stainless, Inc., 7873 N.E. Day Road, Bainbridge Island, WA 98110. Tel.: 888.842.9492; Fax: 206.842.8179; email: info@agsstainless.com.
 - 1) Product: Clearview OLYMPUS to matching existing with wood top rail. See Section 064023 for Hardwood Top Rail.
 - b. Architect approved equivalent.

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 STEEL AND IRON

- A. Tubing and Brackets: ASTM A554, Type 316 Marine Grade Stainless Steel.
- B. Pipe: ASTM A554, Type 316, Marine Grade Stainless Steel. Size, configuration, and spacing to matching existing match existing.
- C. Plates, Shapes, Bars and Cover: ASTM A554, Type 316 Marine grade Stainless Steel.

2.04 FASTENERS

- A. General: Provide the following:
 - 1. Stainless Steel Railings: ASTM A554, Type 316 stainless-steel.
- 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.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- C. 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.
- D. 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. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- F. Connections: Fabricate railings with welded connections unless otherwise indicated.
- G. 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.
- H. Form changes in direction as follows:
 1. As detailed.
- I. 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.
- J. Close exposed ends of railing members with prefabricated end fittings.
- K. 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.
- L. 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.
- M. 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.

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. Finish for Stainless Steel: No. 4 Brushed Finish.
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable 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.
- E. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

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. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. 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.

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 square flanges with radius flange corners as required by conditions, connected to posts and to metal supporting members using fittings designed and engineered for this purpose. Provide factory fabricated cover plates to match material of the railing system.

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. Install matching flange covers as indicated on the drawings.
- 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 Stainless Steel as recommended by the manufacturer.

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. Miscellaneous Framing and Sheathing.
 - 3. Plywood Subfloors.
 - 4. Fasteners.
 - 5. Structural Hold Downs, Connectors and Framing Accessories.
 - 6. Framing with timber.
 - 7. Framing with engineered wood products.
 - 8. Wood blocking, cants, and nailers.
 - 9. Wood furring and grounds.

1.03 REFERENCES:

- A. AWWA - (American Wood Preservers Association) C1 - All Timber Products Preservative Treatment by Pressure Process.
- B. APA - American Plywood Association.
- C. AITC - American Institute of Timber Construction.
- D. US Department of Commerce (DOC):
 - 1. DOC PS 1 - Performance Standard for Structural Plywood.
 - 2. DOC PS 2 - Performance Standard for Wood-Based Structural Panels.
- E. International Code Council (ICC):
 - 1. ICC IBC - International Building Code

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. Timber: Lumber of 5 inches nominal or greater in least dimension.
- D. 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 D 5664.
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. Engineered wood products.
 5. Shear panels.
 6. Power-driven fasteners.
 7. Powder-actuated fasteners.
 8. Expansion anchors.
 9. 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.
- C. Stack panels flat with a minimum of three, full panel width, 4 inch by 4 inch spacers per eight foot panel length beneath and between each bundle to provide air circulation. Protect sheathing 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. Timber.
 - 3. Laminated-veneer lumber.
 - 4. Parallel-strand lumber.
 - 5. 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.
- D. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- E. Plywood: Conform to requirements and recommendations provided in DOC PS 1 - Voluntary Product Standard for Construction and Industrial Structural Plywood.

2.02 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWP A 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 framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
 - 5. 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 D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841.
- 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. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.
 - 1. Application: Interior partitions not indicated as load-bearing.
 - 2. Species:
 - a. Hem-fir (north); NLGA.
 - b. Spruce-pine-fir (south); NeLMA, WCLIB, or WWP.
 - c. Northern species; NLGA.
- B. Load-Bearing Partitions: No. 2 grade.
 - 1. Species:
 - a. Southern pine; SPIB.
 - b. Douglas fir-larch; WCLIB or WWP.
 - c. Hem-fir; WCLIB or WWP.
 - d. Douglas fir-larch (north); NLGA.
 - e. Spruce-pine-fir (south); NeLMA, WCLIB, or WWP.
- C. Load-Bearing Partitions: Any species and grade with a modulus of elasticity of at least 1,600,000 psi and an extreme fiber stress in bending of at least for 2-inch nominal thickness and 12-inch nominal width for single-member use.
 - 1. Application: Exterior walls and interior load-bearing partitions.
- D. Ceiling Joists: Construction or No. 2 grade.
 - 1. Species:
 - a. Southern pine; SPIB.
 - b. Hem-fir; WCLIB or WWP.
 - c. Douglas fir-south; WWP.
 - d. Eastern softwoods; NeLMA.
- E. Joists, Rafters, and Other Framing Not Listed Above: No. 1 grade.
 - 1. Species:
 - a. Douglas fir-larch; WCLIB or WWP.
 - b. Douglas fir-larch (north); NLGA.
 - c. Spruce-pine-fir (south); NeLMA, WCLIB, or WWP.
- F. Joists, Rafters, and Other Framing Not Listed Above: Any species and grade with a modulus of elasticity of at least 1,500,000 psi (10 350 MPa) and an extreme fiber stress in bending of at least 1000 psi (6.9 MPa) for 2-inch nominal thickness and 12-inch nominal width for single-member use.
- G. 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; WWP.
 - 3. Species and Grade: Hem-fir; No. 1 grade; WCLIB or WWP.

2.05 TIMBER FRAMING

- A. Provide timber framing complying with the following requirements, according to grading rules of grading agency indicated:
 - 1. Species and Grade: Douglas fir-larch, Douglas fir-larch (north), or Douglas fir-south; No. 1 grade; NLGA, WCLIB, or WWP.

2. Species and Grade: Eastern hemlock, eastern hemlock-tamarack, or eastern hemlock-tamarack (north); No. 1 grade; NeLMA or NLGA.
3. Species and Grade: Mixed oak; Select Structural grade; NeLMA.

2.06 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.

2.07 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.

2.08 ENGINEERED WOOD PRODUCTS

- A. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.
- B. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
 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. Georgia-Pacific.
 - b. Louisiana-Pacific Corporation.
 - c. Weyerhaeuser Company
 - d. Or approved equal.
 2. Extreme Fiber Stress in Bending, Edgewise: 2900 psi for 12-inch nominal depth members.
 3. Modulus of Elasticity, Edgewise: 1,900,000 psi .
- C. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D2559

2.09 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.

2.10 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.

2.11 METAL FRAMING ANCHORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Cleveland Steel Specialty Co.
 2. Simpson Strong-Tie Co., Inc.
 3. USP Structural Connectors.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Provide products that have been approved by the ICC-Evaluation Service with an accompanying Evaluation Service Report (ESR) listing locations of allowable use.

- D. Joist Hangers: U-shaped joist hangers with 2-inch long seat and 1-1/4-inch wide nailing flanges at least 85 percent of joist depth.
 - 1. Thickness: 0.062 inch.
- E. I-Joist Hangers: U-shaped joist hangers with 2-inch long seat and 1-1/4-inch wide nailing flanges full depth of joist. Nailing flanges provide lateral support at joist top chord.
 - 1. Thickness: 0.062 inch.
- F. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
 - 1. Strap Width: 1-1/2 inches.
 - 2. Thickness: 0.062 inch.
- G. Bridging: Rigid, V-section, nail-less type, 0.050 inch thick, length to suit joist size and spacing.
- H. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
 - 1. Width: 1-1/4 inches.
 - 2. Thickness: 0.062 inch.
 - 3. Length: As indicated.
- I. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick. Tie fasteners to side of rafter or truss, face of top plates, and side of stud below.
- J. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.
- K. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.
- L. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.
 - 1. Bolt Diameter: 3/4 inch.
 - 2. Width: 3-3/16 inches.
 - 3. Body Thickness: 0.138 inch.
 - 4. Base Reinforcement Thickness: 0.108 inch.
- M. Wall Bracing: T-shaped bracing made for letting into studs in saw kerf, 1-1/8 inches (29 mm) wide by 9/16 inch deep by 0.034 inch thick with hemmed edges.
- N. Wall Bracing: Angle bracing made for letting into studs in saw kerf, 15/16 by 15/16 by 0.040 inch thick with hemmed edges.

2.12 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 D 3498 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. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of permanent bracing.
- D. Place horizontal members flat, crown side up.
- E. Construct load bearing framing and curb members full length without splices.
- F. Double members at all openings. Space short members over and under opening to member spacing.
- G. Bridge framing in excess of 8 feet span at midspan.
- H. Coordinate installation of adjacent construction.
- I. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- J. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
- K. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- L. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- M. Do not splice structural members between supports unless otherwise indicated.
- N. 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.

- O. 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.
- P. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- Q. 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 2020 Building Code of New York State".
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
- R. Warped wood members shall not be used unless they can be fastened adequately to permanently hold them in their required alignment.
- S. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Comply with approved fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
 - 2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
 - 3. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

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 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal (38-mm actual) thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction unless otherwise indicated.
 - 1. For exterior walls, provide 2-by-6-inch nominal size wood studs spaced 24 inches o.c. unless otherwise indicated.
 - 2. For interior partitions and walls, provide 2-by-4-inch nominal size wood studs spaced 16 inches o.c. unless otherwise indicated.
- B. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.
 - 2. For load-bearing walls, provide double-jamb studs for openings 60 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated or, if not indicated, according to Table R602.7(1) or Table R602.7(2), as applicable, in ICC's International Residential Code for One- and Two-Family Dwellings.

3.06 FLOOR JOIST FRAMING INSTALLATION

- A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists as follows:
 - 1. Where supported on wood members, by toe nailing or by using metal framing anchors.
 - 2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.
- B. Fire Cuts: At joists built into masonry, bevel cut ends 3 inches and do not embed more than 4 inches.
- C. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.
- D. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches from top or bottom.
- E. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists unless nailed to header or band.
- F. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.

- G. Anchor members paralleling masonry with 1/4-by-1-1/4 inch metal strap anchors spaced not more than 96 inches o.c., extending over and fastening to three joists. Embed anchors at least 4 inches into grouted masonry with ends bent at right angles and extending 4 inches beyond bend.
- H. Provide solid blocking between joists under jamb studs for openings.
- I. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.
 - 1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.
- J. Provide bridging of type indicated below, at intervals of 96 inches o.c., between joists.
 - 1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal size lumber, double-crossed and nailed at both ends to joists.
 - 2. Steel bridging installed to comply with bridging manufacturer's written instructions.

3.07 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
 - 1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal size or 2-by-4-inch nominal size stringers spaced 48 inches o.c. crosswise over main ceiling joists.
- B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
 - 1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
 - 2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.08 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.

3.09 TOLERANCES

- A. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.10 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing.
 - 2. Roof sheathing.
 - 3. Sheathing joint and penetration treatment.

1.02 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. ASME B18.6.1 - Wood Screws (Inch Series).
- B. ASTM International (ASTM):
 - 1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - 2. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials
 - 3. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings
 - 4. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials
 - 5. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- C. US Department of Commerce (DOC):
 - 1. DOC PS 2 - Performance Standard for Wood-Based Structural Panels.
- D. International Code Council (ICC):
 - 1. ICC IBC - International Building Code.
- E. ICC Evaluation Service, Inc. (ICC-ES):
 - 1. AC38 - Acceptance Criteria for Weather Resistive Barriers
 - 2. ICC-ES AC116 - Acceptance Criteria for Nails and Spikes
 - 3. ICC-ES AC148 - Acceptance Criteria For Flexible Flashing Materials
- F. International Association of Plumbing and Mechanical Officials (IAPMO):

1.03 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.

1.04 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For following products, from ICC-ES:
 - 1. Fire-retardant-treated plywood.
 - 2. Foam-plastic sheathing.
- B. Product Certifications: From manufacturer, indicating that sheathing products comply with ICC ES AC266 and ICC-ES AC310.

1.05 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.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handle, Transport and Store Plywood Panels in accordance with the APA Storage and Handling recommendations.
- B. Stack panels flat with a minimum of three, full panel width, 4 inch by 4 inch spacers per eight foot panel length beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1.07 WARRANTY

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory".

2.02 WOOD PANEL PRODUCTS

- A. Plywood: DOC PS 1 - Voluntary Product Standard for Construction and Industrial Structural Plywood.
- B. Oriented Strand Board: DOC PS 2, made with binder containing no added urea formaldehyde.
- C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- D. Factory mark panels to indicate compliance with applicable standard.

2.03 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.04 FIRE-RETARDANT-TREATED PLYWOOD

- 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 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 (3.2 m) 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 plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - 4. Design Value Adjustment Factors: Treated lumber plywood shall be tested according ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified. For roof sheathing and where high-temperature fire-retardant treatment is indicated, span ratings for temperatures up to 170 deg F (76 deg C) shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood indicated on Drawings, and the following:
 - 1. Roof and wall sheathing within 48 inches (1220 mm) of fire walls.
 - 2. Roof sheathing.
 - 3. Subflooring and underlayment for raised platforms.

2.05 WALL SHEATHING

- A. Plywood Wall Sheathing: Exterior, Structural I sheathing.
 - 1. Span Rating: Not less than 24/0.
 - 2. Nominal Thickness: Not less than 1/2 inch (13 mm) 5/8 inch (15.9 mm).
- B. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. CertainTeed Corporation; GlasRoc.
 - b. G-P Gypsum Corporation; Dens-Glass Gold.
 - c. National Gypsum Company; Gold Bond e(2)XP.
 - d. United States Gypsum Co.; Securock.
 - 2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
 - 3. Size: 48 by 96 inches (1219 by 2438 mm) for vertical installation.
- C. Cementitious Backer Units: ASTM C1325, Type A.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. USG Corporation; DUROCK Cement Board.
 - b. Or approved equal.
 - 2. Thickness: 1/2 inch (12.7 mm).
- D. Extruded-Polystyrene-Foam Wall Sheathing: ASTM C578, Type IV, in manufacturer's standard lengths and widths with tongue-and-groove or shiplap long edges as standard with manufacturer.

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. Dow Chemical Company (The).
 - b. Pactiv, Inc.
2. Thickness: As indicated.

2.06 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I sheathing.
 1. Span Rating: Not less than 24/0.
 2. Nominal Thickness: Not less than 3/4 inch (19 mm).

2.07 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or Type 304 stainless steel..
- B. Nails, Brads, and Staples: ASTM F1667, ICC AC116 and ICC AC201.
- C. Power-Driven Fasteners: ICC-ES-1539 or NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
 1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117.
- F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117.
 1. For steel framing less than 0.0329 inch (0.835 mm) thick, use screws that comply with ASTM C1002.
 2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C954.

2.08 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 079200 - JOINT SEALANTS.
- B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

- C. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

2.09 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by 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 IBC 2015 Building Code for New York State".
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall and sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.02 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Wall and Roof Sheathing:
 - a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
 - b. Screw to cold-formed metal framing.
 - c. Space panels 1/8 inch (3 mm) apart at edges and ends.
- C. Air and Moisture Barrier: Coordinate sheathing installation with flashing and joint sealant sequencing and installation and with adjacent building air and moisture barrier components to provide complete, continuous air- and moisture- barrier.

- D. Do not bridge expansion joints; allow joint spacing equal to spacing of structural supports.
- E. Install panels with laminated facer to exterior. Stagger end joints of adjacent panel runs. Support all panel edges.
 - 1. Space square-edged panels 0.125 inch (3 mm).
 - 2. Butt edges of self-spacing edge panels.
- F. Roof Sheathing Panel Clips: Where required under code approvals based upon panel thickness and support spacing, provide panel clips located at each unsupported panel butt joint centered between supports.
- G. Apply ZIP System Tape at all panel seams, penetrations, and facer defects or cracks to form continuous weathertight surface. Apply tape according to manufacturer's written instructions and requirements of ICC-ES applicable to tape application.

3.03 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to wood framing with screws.
 - 2. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 3. Install boards with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
 - 4. Install boards with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
 - 1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards unless a tighter spacing is required by Structural Drawings
 - 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
 - 1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards unless a tighter spacing is required by Structural Drawings.
 - 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- E. Seal sheathing joints according to sheathing manufacturer's written instructions.
 - 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
 - 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to

exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

3.04 CEMENTITIOUS BACKER UNIT INSTALLATION

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.05 FOAM-PLASTIC SHEATHING INSTALLATION

- A. Comply with manufacturer's written instructions.
- B. Foam-Plastic Wall Sheathing: Install vapor-relief strips or equivalent for permitting escape of moisture vapor that otherwise would be trapped in stud cavity behind sheathing.
- C. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Wood door frames, glazed frames.
- C. Wood casings and moldings.
- D. Hardware and attachment accessories.

1.02 REFERENCE STANDARDS

- A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018a.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).
- D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2016, with Errata (2017).
- E. AWPA U1 - Use Category System: User Specification for Treated Wood; 2017.
- F. BHMA A156.9 - American National Standard for Cabinet Hardware; 2015.
- G. NHLA G-101 - Rules for the Measurement & Inspection of Hardwood & Cypress; 2015.
- H. PS 1 - Structural Plywood; 2009.
- I. PS 20 - American Softwood Lumber Standard; 2015.
- J. WI (CCP) - Certified Compliance Program (CCP); Current Edition.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with electrical rough-in and installation of associated and adjacent components.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.04 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, 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 in size illustrating wood grain and specified finish.
- E. Samples: Submit two samples of wood trim 6 inch long.
- F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

1.05 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.

1.06 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.
- C. Interior Woodwork Items:
 - 1. Moldings, Bases, Casings, Crown and Miscellaneous Trim: Poplar; prepare for paint finish.
 - 2. Door, Glazed Light, and Pocket Door Frames: Poplar; prepare for paint finish.
 - 3. Stairs, Balustrades, and Handrails: Red Oak; prepare for stained finish.
 - 4. Loose Shelving: Birch plywood; prepare for paint finish.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.
- B. Provide sustainably harvested wood, certified or labeled as specified in Section 061000 - ROUGH CARPENTRY
- C. 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. Softwood Lumber: Poplar species, Planed, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
 - 1. Grading: In accordance with rules certified by ALSC; www.alsc.org.
- B. Hardwood Lumber: Red Oak species, Planed, maximum moisture content of 6 percent, of quality suitable for transparent finish.

2.04 SHEET MATERIALS

- A. Softwood Plywood, Exposed to View: Face species as indicated, plain sawn, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.
- B. Hardwood Plywood: Face species as indicated, plain sawn, book matched, medium density fiberboard core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1, glue type as recommended for application.

2.05 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.

2.06 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.

2.07 HARDWARE

- A. Hardware: Comply with BHMA A156.9.
- B. Standard Shelf, Countertop, and Workstation Brackets:
 - 1. Material: Stainless steel.
 - 2. Finish: Brushed.
 - 3. Products:
 - a. A&M Hardware, Inc ; Standard Brackets: <http://www.aandmhardware.com/#sle>.

2.08 WOOD TREATMENT

- A. Wood Preservative by Pressure Treatment (PT Type): Provide AWPA 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.

2.09 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.

2.10 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. 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. 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.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

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. This Section includes the following:
 - 1. Hardwood Veneer cabinets.
 - 2. Hardwood Veneer Plywood countertops

1.03 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated cabinet hardware and accessories and.
- B. Product Data: For high-pressure decorative laminates and Solid-surfacing materials.
- C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- D. Samples for Initial Selection:
 - 1. Plastic laminates.
- E. Samples for Verification:
 - 1. Plastic laminates, 6 by 6 inches, for each type, color, pattern, and surface finish.
 - 2. Solid-surfacing materials, 3 inches square.
 - 3. Exposed cabinet hardware and accessories, one unit for each type and finish.
- F. Product Certificates: For each type of product, signed by product manufacturer.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
- C. Quality Standard: Unless otherwise indicated, comply with WI's "Manual of Millwork" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - 1. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with such selections and requirements in addition to the quality standard.

- 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. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.
- C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.08 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Provide materials that comply with requirements of quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Products: Comply with the following:
 - 1. Medium-Density Fiberboard, Particle Board, Hardboard, Softwood Plywood, Veneer Faced Panel Products: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
 - 2. Softwood Plywood: DOC PS 1, Medium Density Overlay.
 - 3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

2.02 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
- D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

2.03 FABRICATION, GENERAL

- A. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- B. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.04 SHOP FINISHING

- A. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.02 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 - 2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
- G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of counter top.
 - 1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - 2. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 - 3. Caulk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."
- H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.03 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Partial removal of existing roofing system in preparation for a new roof membrane system at locations indicated.
- B. Verification of roofing contractor certifications and approval of proposed work details with existing Roofing Manufacturer prior to commencement of work to ensure that existing Roofing Warranties will be maintained including all modifications made under this contract (amended to the existing warranty).

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with affected mechanical and electrical work associated with roof penetrations.
- B. Preinstallation Meeting: Convene one week before starting work of this section.
- C. Schedule work to coincide with commencement of installation of new roofing system.

1.03 QUALITY ASSURANCE

- A. Materials Removal Firm Qualifications: Company specializing in performing the work of this section with minimum five years of documented experience.

1.04 FIELD CONDITIONS

- A. Do not remove existing roofing membrane when weather conditions threaten the integrity of the building contents or intended continued occupancy.
- B. Maintain continuous temporary protection prior to and during installation of new roofing system.
- C. Contractor shall perform their own pre-construction field conditions visit and photograph and/or video existing landscape and physical building features and conditions prior to commencement of work. Contractors shall advise the Architect and Owner as to existing damages and conditions which exist that may impede the work of this contract or be construed as damage caused by the work of this contract accordingly.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Temporary Protection: Sheet polyethylene; provide weights to retain sheeting in position.
- B. Protection Board: ASTM C208 cellulose fiber board, one face finished with mineral fiber, asphalt and kraft paper.
 - 1. High Density, Type II, Grade 2.
 - 2. Board Thickness: 5/8" inch

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing roof surface is clear and ready for work of this section.

3.02 PREPARATION

- A. Sweep roof surface clean of loose matter.
- B. Remove loose refuse and dispose off site.

3.03 MATERIAL REMOVAL

- A. Remove only existing roofing materials that can be replaced with new materials the same day.
- B. Cut and lay flat any membrane blisters.
- C. Remove insulation and fasteners, cant strips, blocking.
- D. Repair existing fiber board deck surface to provide smooth working surface for new roof system.

3.04 FIELD QUALITY CONTROL

- A. The drawings identify the approximate limits to material removal.

3.05 PROTECTION

- A. Provide temporary protective sheeting over uncovered deck surfaces.
- B. Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights.
- C. Provide for surface drainage from sheeting to existing drainage facilities.
- D. Do not permit traffic over unprotected or repaired deck surface.
- E. Install recovery board over all surfaces used for roof access, equipment, tool, material storage. Contractor shall make permanent repair to any and all roof surfaces damaged..
- F. If roof top storage is permitted, contractor shall evenly distribute material across the roof in order to avoid damage to the structural roof deck. Contractor assumes full responsibility for loading the structural roof deck during contract operations. The Architect reserves the right to reject and require removal / relocation of such loadings deemed unacceptable.

3.06 SCHEDULES

- A. Roof Areas as Indicated: Remove existing roofing membrane, insulation, vapor retarder, and decking to permit new structurally reinforced HVAC location penetrations.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Fully adhered 60 mil ethylene propylene diene monomer (EPDM) single-ply system utilizing tape seams, and fully adhered flashings with reinforced termination strips on existing roof deck.
- B. Tapered and Base roof insulation system. (LTTR=30 minimum)
- C. Complete Single-Source membrane roofing system with manufacturer's 20-year, no dollar limit (NDL) warranty. Verification of roofing contractor certifications and approval of proposed work details with existing Roofing Manufacturer prior to commencement of work to ensure that existing Roofing Warranties will be maintained including all modifications made under this contract (amended to the existing warranty).
- D. Vapor barrier at all areas.
- E. Flashings and terminations.
- F. Roofing membrane expansion joints
- G. Walkway pads.
- H. Temporary protection against weather

1.02 RELATED SECTIONS

- A. Section 024119 - Selective Demolition.
- B. Section 061000 - Rough Carpentry.
- C. Section 721000 - Thermal Protection.
- D. Section 076200 - Metal Flashing and Trim.
- E. Section 077200 - Roof Accessories.

1.03 REFERENCES

- A. ASTM D4637 - Standard Specification for EPDM Sheet used in Single Ply Roof Membrane
- B. ASTM C272 - Test Method for Water Absorption of Core Materials for Structural Sandwich Construction.
- C. ASTM C1289 - Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
- D. ASTM D412 - Rubber Properties in Tension.
- E. ASTM D624 - Rubber Property - Tear Resistance.
- F. ASTM D746 - Brittleness Temperature of Plastics and Elastomeric by Impact.
- G. ASTM E96 - Water Vapor Transmission of Materials.
- H. Factory Mutual Engineering & Research Corporation (FM) - Roof Assembly Classifications.
- I. National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual.

- J. Underwriters Laboratories, Inc. (UL) - Fire Hazard Classifications.

1.04 SYSTEM DESCRIPTION

- A. Single Source Elastomeric Sheet Membrane Roofing System: Single ply fully adhered membrane system with insulation.

1.05 SUBMITTALS

- A. Submit under provisions of Section 013300 - SUBMITTALS.
- B. Product Data: Provide data for all items to be installed under this specification including, but not limited to, membrane materials, flashing materials, insulation, fasteners, adhesive, miscellaneous system materials, protective covering, and roof walkway pads.
- C. Shop Drawings: Indicate setting plan for tapered insulation, mechanical fastener layout, joint or termination detail conditions, conditions of interface with other materials, roof seam layout, direction of laps and flashing details. Shop drawings must be preapproved by system manufacturers.
- D. Samples: Submit one sample 12 inches x 12 inches in size illustrating insulation and roofing materials.
- E. Manufacturer's Instructions: Indicate special precautions required for seaming the membrane and anchoring the insulation and membrane.
- F. Manufacturer's Certificate: Certify that components and products meet or exceed specified standards and comply with referenced standards.
- G. Manufacturers Certification, submitted in writing prior to bid date, indicating that applicator has 5 years minimum documented experience, and is a certified installer approved to install the manufacturer's 20 year roofing system as specified. Failure to provide this submission may result in disqualification of the bidder.
- H. Material Safety Data Sheets (MSDS) for all products.
- I. Submit Phasing Plan indicating sequence of work to be performed.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.
- B. Single Source Responsibility: All specified roofing system materials and components shall be supplied and warranted by membrane manufacturer.
- C. Regulatory Requirements for Roof Assembly: In compliance with IBC 2015 with supplements as applicable.
 - 1. Comply with Factory Mutual System Approval Guide to provide FMRC-Approved roof assembly meeting Class IA-90 (FM Standard 4450) requirements for fire resistance and wind uplift in accordance with FM Loss Prevention Data Sheets 1-28 and 1-29. System shall meet uplift pressures in accordance with the IBC 2015, using 130mph base wind speed.
 - 2. Underwriters Laboratories, Inc. (UL): Class A Fire Hazard Classification.

D. Qualifications:

1. Manufacturer: Company specializing in manufacturing the products specified in this section with 10 years documented experience.
2. Applicator: Company specializing in performing the work of this section with 5 years documented experience. Installer shall be an authorized roofing applicator for the system being installed. Manufacturer is to certify that applicator has 5 years minimum documented experience, and is a certified installer approved to install the manufacturer's 20 year roofing system as specified.

E. Pre-installation Meeting:

1. Convene a Pre-installation Meeting at Project Site one week prior to date scheduled for commencing work of this Section.
2. Require attendance of parties directly affecting work of this Section.
3. Review preparation and installation procedures, and coordinating and scheduling required, with related work.
 - a. Require Manufacturer's Roofing Quality Control Inspector to attend and participate in Pre-installation Meeting along with Contractor Quality Control Representative and Architect/Engineer.
4. Agenda:
 - a. Tour, inspect and discuss existing conditions, roof drains, roof drain final locations, curbs, penetrations, flashing, and other preparatory work performed by other trades.
 - b. Review structural loading limitations of deck, inspect existing pitch to drains, and review conditions for required fastening.
 - c. Review of on-site approved shop drawings for field conditions.
 - d. Review roofing system requirements (Drawings, Specifications and other Contract Documents).
 - e. Review required submittals, both completed and yet to be completed.
 - f. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - g. Review requirements for Manufacturer's Roofing Quality Control Inspector inspections, other inspections, testing, certifying, and material usage accounting procedures.
 - h. Review procedures and verify readiness of contractor for coping with unfavorable weather conditions, including the possibility of requiring emergency weather protection.
 - i. Review safety precautions relating to roofing installation.
 - j. Square foot area phasing and overnight roof seal and protection.
 - k. Asbestos abatement coordination.
 - l. Debris removal.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code(s) for roof assembly fire hazard requirements.
- B. Underwriters Laboratories, Inc. (UL): Class A Fire Hazard Classification.
- C. Factory Mutual (FM) 1-90 Compliance / Roof Assembly and 1-49 Loss Prevention Data Sheet.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 016500.
- B. Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact. Upon observation by Architect and at Architect's direction, remove plastic shipping material.

Materials being stored are to be covered with canvas; poly will not be accepted as a cover material.

- C. Store products in weather protected environment, clear of ground and moisture.
- D. Protect foam insulation from direct exposure to sunlight, precipitation, and condensation.
- E. All curable materials must be stored between 60° F and 80° F.
- F. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.
- G. All components including underlayment, flashings, and metal edgings must be supplied and warranted by the roof system manufacturer.
- H. Do not store roofing materials and other miscellaneous materials in concentration on roof.

1.09 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Do not apply roofing membrane during inclement weather or when ambient temperature is expected to fall below 40 degrees F. Follow cold weather application procedures recommended by manufacturer.
 - 2. Do not apply roofing membrane to wet, damp or frozen deck surface or when precipitation is occurring.
 - 3. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed in the same day.
 - 4. Proceed with roofing work when existing & forecasted weather conditions permit work to be performed in accordance with manufacturer's recommendations and warranty requirements.
- B. Coordination
 - 1. Coordinate work under provisions of Section 013100.
 - 2. Coordinate the work with the installation of associated metal flashings, roof drains and other penetrations, asbestos abatement, and roof demolition.
 - 3. Coordinate with Owner's operations.
- C. Provide covers and other means of protection as necessary to protect building surfaces against damage during roofing work.
- D. Protect existing roof surfaces from foot traffic etc. in accord with manufacturer's recommendations. Repair, at contractor's expense, all damage to existing roof system in areas subjected to construction foot traffic, etc.
- E. No storage or traffic is to occur outside of the contract limits.

1.10 WARRANTY

- A. Contractor's Guarantee
 - 1. The contractor guarantees that the total roofing installation, together with all related composition flashings, plastic flashings, metal flashings, roof insulation, any vapor seal, cants, blocking, adhesives and seals installed in connection with same, will be watertight and free from defects as to materials, installation, and/or workmanship, for a period of two (2) years from the date approval of the Final Certificate for Payment.
 - 2. During the 2-year guarantee period, the Contractor agrees that within 24 hours of receipt of notice from the District, he will inspect and make immediate emergency repairs to

- defects or to leaks in roof system, and that within a reasonable time, (within days) he will restore the affected items to the standard of the original specifications.
3. All emergency and permanent work during the life of the Contractor's guarantee will be done without cost to the District, except in the event it is determined that such leaks were caused by abuse, lightning, hurricane, tornado, hail storm, other unusual climatic phenomena of the elements, or failure of adjacent or related work previously installed by others.
- B. Manufacturers Warranty:
1. Submit 20 year total roof system written warranty, with no dollar limit (NDL), signed by roofing system manufacturer agreeing to promptly repair leaks in roof membrane and base flashings resulting from defects in materials and workmanship. Peak wind coverage of 90mph measured 10 meters above ground and damage from hail measuring upto and including 2" in diameter.
 2. Include the following items within Warranty:
 - a. Membranes.
 - b. Flashings, including metal flashings and accessories supplied by roofing membrane manufacturer.
 - c. Insulation.
 - d. Vapor barrier and liquid applied waterproofing.
 - e. Fasteners, primers and adhesives.
 - f. Accessories.
 - g. Roofing inspection and written report by Manufacturer's Roofing Quality Control Inspector at date of Final Acceptance.
 - h. Roofing manufacturer will provide unlimited repairs during warranty period with no cost limitation.
 - i. Temporary emergency repairs may be made in accordance with Manufacturer's specifications by the District without voiding any warranty provisions.
 3. Attach copy of Record Document Roof Plan Drawings, Roof Detail Drawings, and Record Roofing Specification Section to Warranty.
 4. Install a framed and waterproofed copy of the following items mounted in roof hatchway: Warranty and instructions including system description, repair procedures, installation contractor, warranty information and contact telephone / email addresses.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Obtain components including but not limited to: roof insulation, fasteners, vapor retarder, membrane, adhesives, tapes, flashings, metal edges, copings as applicable and cover board for roofing system from same manufacturer as membrane roofing.

2.02 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing, base flashing, and edge and coping conditions 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 G 154, or ASTM G 155.
 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
- 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, Perimeter and Field-of-Roof Uplift Pressure:
 - a. Field: 75 psf
 - b. Perimeter: 125 psf
 - c. Corner: 165 psf
 - d. Hail-Resistance Rating: 2" Hail Resistance
- D. Exterior Fire-Test Exposure: ASTM E 108 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.

2.03 EPDM ROOFING

- A. EPDM: ASTM D 4637, Type I, nonreinforced, uniform, flexible EPDM sheet.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Versico Roofing Systems; VersiGARD EPDM or a comparable product by one of the following:
 - a. Carlisle Syntec Systems.
 - b. Firestone Building Products.
 - c. Johns Manville.
 - d. Thickness: 60 mils (2.2 mm), nominal.
 - e. Exposed Face Color: White.
- B. Seaming Materials: As provided by membrane manufacturer.
- C. Polyisocyanurate bonded foam surfaced insulation as indicated below. Minimum insulation thickness over the field of each single roof surface shall not be less than 5.2" (LTTR value = 30), within 4'-0" of Roof Drain shall not be less than 4.2". Required thickness to be achieved using a minimum of two (2) layers of insulation.
 - 1. ASTM C578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84, Type IV, 25psi minimum.
 - 2. Overlayed insulation board applied as a second layer with joints offset from bottom layer.
- D. Tapered Insulation: Provide crickets, saddles, and tapered insulation of same material as second layer of insulation; taper to the following slopes:
 - 1. Crickets and Saddles: 1/2" inch per foot, or as required to provide adequate positive drainage.
 - 2. Insulation Installed to Counterslope Roof Structure: 1/2" inch per foot, or twice slope of roof.
 - 3. Insulation over level roof structure: Shall be fabricated with a taper of 1/8 inch per foot, minimum on re-roofing projects and 1/4 inch per foot on new roofing installations.

2.04 ACCESSORIES

- A. Base Flashings: Flexible sheet flashing, type to suit membrane sheeting and as recommended by the roofing manufacturer.
- B. Prefabricated Control or Expansion Joint Flashing: Type approved by roofing manufacturer.
- C. Substrate Board: Securock Gypsum Fiber Board 5/8" x 48" x 96". Fastened with manufacturer supplied fasteners and 3" plates at a rate of one every two square feet in the field. Perimeter and corner enhancements as required per project wind speed requirements

- D. Vapor Barrier / Temporary Roof: 725 Air and Vapor Barrier 40-mil composite consisting of 35 mils of self-adhering rubberized asphalt factory laminated to a 5-mil polyethylene film with an adhesive textured surface. 725 TR roll dimensions are 39" x 75' and the product is applied after priming with 702 LV asphalt primer or Cav-Grip primer
- E. Insulation Adhesive: DASH Insulation adhesive shall be used in 4" on-center ribbon patterns to adhere the base layer to the 725 TR, the tapered layers to the base layer and the coverboard to the tapered layer. All layers of boards to be completely staggered. Manufacturer's installation guidelines to be completely followed.
- F. Pressure Sensitive Flashing: 6" wide; self-adhering as recommended by membrane manufacturer.
- G. Membrane fastening plates: "RTS" strips and corresponding anchors as recommended by membrane manufacturer.
- H. Pitch Pockets: Pourable sealer pockets: Membrane manufacturer's standard. Top pitched to roofing membrane ½" per foot, minimum.
- I. Sealants and Primer: As recommended by membrane manufacturer.
- J. Membrane Adhesive and anchors: As recommended by membrane manufacturer.
- K. Termination Bar: Manufacturer standard.
- L. Walkway Pads: As manufactured by membrane manufacturer, to be installed around all rooftop equipment, as indicated on plans. Pads are to be fully adhered to membrane with continuous lap sealant around perimeter.
- M. Molded Pipe Flashings inside and outside corner flashing: as recommended by membrane manufacturer.
- N. Cover Board: ASTM C 1278/C 1278M, cellulosic-fiber reinforced, water-resistant gypsum substrate, 5/8 inch (16 mm) thick; Basis-of-Design Product: Versico Roofing Systems; Securock Roof Board.

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 wood blocking, curbs, and nailers are securely anchored to roof deck or structure at penetrations, roof edges and terminations and that nailers match thicknesses of insulation.
- 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.
- C. Install roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition.

3.04 BASE SHEET INSTALLATION

- A. Clean substrate of any residual debris.
- B. Notify architect of any damaged decking.
- C. Gypsum Fiber Roof Board (USG Securock or approved equal), 5/8" x 48" x 96". Fasten with manufacturer recommended fasteners and 3" plates at a rate of one every two square feet.
- D. 725 Air and Vapor Barrier is a 40-mil composite consisting of 35 mils of self-adhering rubberized asphalt factory laminated to a 5-mil polyethylene film with an adhesive textured surface. 725 TR roll dimensions are 39" x 75' and the product is applied after priming with 702 LV asphalt primer or Cav-Grip primer
- E. Sweep and blow clean base sheet prior to installation of the insulation and adhesive.
- F. Do not install more base sheet than can be covered in a day. All material to be covered with installed assembly.
- G. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.05 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.
- D. Install insulation under area of roofing to achieve required thickness. Install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) 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 (6 mm) with insulation.
 - 1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- G. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - 1. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
- H. 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 (150 mm) in each direction. Loosely butt cover boards together.
 - 1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.06 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. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- C. 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.
- D. Apply roofing with side laps shingled with slope of roof deck where possible.
- E. 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. Factory seam tape at 3" wide. Field seam tape at 6" wide.
- F. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.
- G. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal membrane roofing in place with clamping ring.

3.07 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars with water cutoff mastic and continuous bead of sealant at top.

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 PHASING OF WORK

- A. Perform work when weather forecast indicates 3-days clear.
- B. Perform work at times and in sequences approved by the School District.
- C. Perform work in sequence with the approved Phasing Plan.

3.10 FIELD QUALITY CONTROL

- A. Section 014500 - Quality Control: Field inspection.
- B. Manufacturer's Field Services: Manufacturer's Roofing Quality Control Inspector.
 - 1. Attend and participate in Pre-installation Meeting.
 - 2. Perform preparatory, initial, follow-up and final inspections for roof insulation and roofing system.
 - 3. Prepare and submit inspection and acceptance reports every two weeks, for each inspection made, to the Architect.
- C. Upon completion of the installation a manufacture's technical representative must conduct an on site inspection in the presence of the Architect/Engineer to insure that the installation has been installed in accordance with the manufacturers specifications.
- D. Protect interior spaces and individuals beneath work from water and construction debris during project.
- E. Provide and coordinate flood testing.
- F. Correct identified defects and irregularities.

3.11 CLEANING

- A. Section 017423 - Part 3 - Execution: Requirements for cleaning.
- B. In areas where finished surfaces are soiled by work of this section, consult manufacturers of surfaces for cleaning advice and conform to their instructions.
- C. Repair or replace defaced or disfigured finishes caused by work of this section.

3.12 PROTECTION

- A. Protect finished work under provisions of Section 015000.
- B. Protect building surfaces against damage from roofing work.
- C. Where, by necessity, work shall continue over finished roof membrane, protect surfaces. Stage work in such a manner so that areas most remote from the staging area are completed first to prevent, to the maximum extent possible, work or traffic over previously re-roofed areas.

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. Hybrid Styrene-butadiene-styrene (SBS) modified bituminous membrane roofing system including but not limited to:
 - a. Removal and legal disposal of all existing roofing, insulation and flashings down to concrete decks and lightweight concrete over cementitious wood fiber (Tectum) roof decks.
 - b. Prime concrete decks.
 - c. Tri-laminate base sheet fastened at lightweight concrete over Tectum roof decks.
 - d. Polyisocyanurate insulation adhered in low rise foam insulation adhesive.
 - e. 1/2" reinforced gypsum cover board adhered over polyisocyanurate insulation in low rise foam insulation adhesive.
 - f. White fleece-backed thermoplastic membrane roofing adhered in non- foamed cold-applied adhesive on low roof.
 - g. White fleece-backed thermoplastic membrane roofing adhered in hot- applied SEBS-modified asphalt on high roof.
 - h. Membrane base flashings, cold applied.
 - i. Walkways at indicated areas.
 - j. Metal perimeter flashings, counter flashings, components and miscellaneous accessories as required.
- B. Related Sections:
 - 1. Division 06 Section "Miscellaneous Carpentry" for wood nailers, cants, curbs, and blocking.
 - 2. Division 07 Section "Preparation for Reroofing" for requirements for existing roof tear-off.
 - 3. Division 07 Section "Sheet Metal Flashing and Trim" for custom metal roof penetration flashings and counter flashings.

1.03 DEFINITIONS

- A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.04 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane 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. Membrane roofing and base flashings shall remain watertight.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Provide membrane roofing system that has been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
 - 1. Auditorium Roof:
 - a. Field-of-Roof Uplift Pressure: 120 lbf/sq. ft.

- b. Perimeter Uplift Pressure: 180 lbf/sq. ft.
 - c. Corner Uplift Pressure: 255 lbf/sq. ft.
- D. Flashings and Fastening: Comply with requirements of Division 07 Sections "Sheet Metal Flashing and Trim" and "Roof Specialties." Provide base flashings, perimeter flashings, detail flashings and component materials and installation techniques that comply with requirements and recommendations of the following:
- 1. FMG 1-49: Loss Prevention Data Sheet for Perimeter Flashings.
 - 2. FMG 1-29 (rev. 1-06): Loss Prevention Data Sheet for Above Deck Roof Components.
 - 3. NRCA Roofing and Waterproofing Manual (Fifth Edition) for construction details and recommendations.
 - 4. SMACNA Architectural Sheet Metal Manual (Fifth Edition) for construction details.
 - 5. The metal edge securement, except gutter, shall be installed as tested in accordance with the most current version of the ANSI\SPRI ES-1, American National Standard for Edge Systems Used with Low-Slope Roofing Systems.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Tapered insulation layout, including thicknesses and slopes.
 - 2. Base flashings and membrane terminations.
 - 3. Crickets, saddles, and tapered edge strips, including slopes.
- C. Samples for Verification: For the following products:
 - 1. 8-by-10 inch sample of tri-laminate base sheet.
 - 2. 8-by-10-inch sample of thermoplastic membrane roofing.
 - 3. 8-by-10-inch of sample granulated cap sheet.
 - 4. 4-by-4-inch of roof insulation and cover board.
 - 5. Six base sheet fasteners of each type and length.
 - 6. 8-by-10-inch sample of walkway.

1.06 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
- B. Manufacturer Certificates: Signed by roofing manufacturer certifying that thermoplastic membrane roofing complies with requirements specified in "Performance Requirements" Article.
 - 1. Provide copies of FM RoofNav approval assemblies and/or UL TGFU & TGIK wind uplift and fire rating assemblies showing approved substitutions.
- C. Qualification Data: For manufacturer's technical representative.
- D. Warranties: Sample of warranties as specified in this Section.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to perform Work of this Section who has specialized in installing cold process roofing systems; who is approved, authorized, or licensed by the roofing system manufacturer to install manufacturer's product; and who is eligible to receive and issue the roofing manufacturer's warranty.
 - 1. Applicators to include a list of projects, completed within the last three (3) years of, similar size, and within 50 miles of project site using the submitted manufacturer's cold applied

roofing products. Include names and addresses of Architects and Owners, and other information with bid.

- B. Installing contractor shall not own the roofing materials manufacturer, shall not be owned by the roofing materials manufacturer, and shall not be a subsidiary of or with the roofing materials manufacturer.
- C. Manufacturer Qualifications: Manufacturer shall demonstrate a minimum (10) ten- year track record of successful production and application of cold process roofing systems. Include names and addresses of architects and owners, and other information as needed.
- D. Source Limitations: Roofing membrane plies, base flashings and insulation adhesive materials to be supplied by a single manufacturer with said products branded by the single manufacturer issuing the roofing warranty. Auxiliary materials to be approved by roofing system manufacturer.
- E. Inspection Reports: Provide copies of the roofing system manufacturer's inspection reports noted during and at the completion of the new roof installation. Manufacturer's Technical (non-sales) Representative must inspect roof installation every other day and report progress to Owner's representative. Provide progress photos for application of each operation of roofing system. In addition to regular inspections, Manufacturer's Technical (non-sales) Representative shall be present for roof work starts at each section. Manufacturer's Technical Representative shall provide proof of no less than 10 years experience in the Roofing Industry.
- F. Roofing Inspections: Arrange for roofing inspections by roofing system manufacturer's technical personnel as required in Part 3 Article "Field Quality Control."
- G. Roofing Inspector Qualifications: A full time technical representative of manufacturer (non-sales) experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification.
 - 1. The Roofing Inspector shall be one of the following:
 - a. An authorized full-time technical employee of the manufacturer with 10 years experience in commercial roofing.
 - b. If manufacturer does not employ full time technical personnel, inspection personnel shall be certified as a Registered Roof Observer by the Roof Consultants Institute, and shall be experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project.
- H. Provide installer's field supervision. Installer must maintain full-time supervisor/foreman on job-site during times that roofing work is in progress. Supervisor must have a minimum of 5 years experience in roofing work similar to nature and scope of specified roofing.
- I. Source Limitations: Obtain roofing system components from or approved in writing by roofing system manufacturer.
- J. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test- response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
 - 1. Exterior Fire Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.
 - 2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.

- K. Random Sampling:
1. Roofing material:
 - a. During course of work, Owner's Representative may secure samples according to ASTM D140-93 of materials being used from containers at job site and submit them to an independent laboratory for comparison to specified material.
 - b. Should test results prove that a material is not functionally equal to specified material:
 - 1) Contractor shall pay for all testing.
 - 2) Roofing installed and found not to comply with the specifications shall be removed and replaced by contractor at no change in the contract price.
- L. Fastener Pull Testing: Contractor shall retain the services of an accredited testing laboratory, or certified fastener manufacturer's representative, to conduct fastener "pull-out" testing to assure compliance with specified wind uplift pressures. Contractor to submit pull out testing results report to Architect.
1. Fastener quantities to be determined from the resistance achieved by the pull out tests performed by the Contractor.
 2. The following excerpt is from FMG 1-29 (rev. 9-2010 Sections 2.2.4 & 2.2.5)
 - a. 2.2.5.2.6. When reroofing or recovering over gypsum, cementitious wood fiber, or lightweight insulating concrete decks, verify fastener pull- out performance with field tests. Perform 5 pull-out tests per 50,000 ft² using FM Approved fastening or a minimum of 5 tests. Run additional tests if inconsistent results are obtained. On larger roofs, the number of tests above the minimum can be reduced if consistent results are obtained. Fastener spacing is calculated per section 2.2.4.1.3. It is not necessary to run pull-out tests of fasteners FM Approved for installation in steel deck, structural concrete, nominal 3/4 in. (19 mm) plywood, or nominal 2 in. (51 mm) lumber decks, unless the condition of the deck is in question.
 - b. 2.2.4.1.3 When pull-out tests are done, base the fastener density on the more conservative of either the FM Approved spacing for the fastener plate/insulation/roof cover combination, or the spacing needed based on the average pull-out performance.
 - 1) Example: An existing deck is oriented strand board (OSB). The fastener/insulation/roof cover combination is FM Approved for 4 fasteners per 4 × 4 ft (1.2 × 1.2 m) board for Class 1-90 on steel deck. The calculated load per fastener would be 360 lb (1600 N) $[(4 \text{ ft}^2/\text{fastener})][90 \text{ psf}] = 360 \text{ lb/fastener}$. If the proposed fastener achieved a pull-out resistance of 360 lb (1600 N) or more in the deck, the FM Approved spacing would be used. If the fastener achieved a resistance of less than 360 lb (1600 N), for example 300 lb (1335 N), calculate the spacing as follows: $(16 \text{ ft}^2)(90 \text{ psf})/(300 \text{ lb}) = 4.8 \text{ fasteners per board}$; use five fasteners per board in the roof field. Additional fasteners would be needed in the corners and perimeter per section 2.2.1.4.3. The percentage increase would be applied to five fasteners per board, not four.
- M. Fastener Pull Testing: Contractor shall retain the services of an accredited testing laboratory, or certified fastener manufacturer's representative, to conduct fastener "pull-out" testing to assure compliance with specified wind uplift pressures. Contractor to submit pull out testing results report to Architect.
1. Fastener quantities to be determined from the resistance achieved by the pull out tests performed by the Contractor.
 2. The following excerpt is from FMG 1-29 (rev. 9-2010 Sections 2.2.4 & 2.2.5)
 - a. 2.2.5.2.6. When reroofing or recovering over gypsum, cementitious wood fiber, or lightweight insulating concrete decks, verify fastener pull- out performance with field tests. Perform 5 pull-out tests per 50,000 ft² using FM Approved fastening or a minimum of 5 tests. Run additional tests if inconsistent results are obtained. On larger roofs, the number of tests above the minimum can be reduced if consistent results are obtained. Fastener spacing is calculated per section 2.2.4.1.3. It is not necessary

to run pull-out tests of fasteners FM Approved for installation in steel deck, structural concrete, nominal 3/4 in. (19 mm) plywood, or nominal 2 in. (51 mm) lumber decks, unless the condition of the deck is in question.

- b. 2.2.4.1.3 When pull-out tests are done, base the fastener density on the more conservative of either the FM Approved spacing for the fastener plate/insulation/roof cover combination, or the spacing needed based on the average pull-out performance.
 - 1) Example: An existing deck is oriented strand board (OSB). The fastener/insulation/roof cover combination is FM Approved for 4 fasteners per 4 × 4 ft (1.2 × 1.2 m) board for Class 1-90 on steel deck. The calculated load per fastener would be 360 lb (1600 N) $[(4 \text{ ft}^2/\text{fastener})[90 \text{ psf}] = 360 \text{ lb/fastener}]$. If the proposed fastener achieved a pull-out resistance of 360 lb (1600 N) or more in the deck, the FM Approved spacing would be used. If the fastener achieved a resistance of less than 360 lb (1600 N), for example 300 lb (1335 N), calculate the spacing as follows: $(16 \text{ ft}^2)(90 \text{ psf})/(300 \text{ lb}) = 4.8$ fasteners per board; use five fasteners per board in the roof field. Additional fasteners would be needed in the corners and perimeter per section 2.2.1.4.3. The percentage increase would be applied to five fasteners per board, not four.
- N. Pre-Bid Roofing Conference: Conduct conference at Project site.
- O. Pre-installation Roofing Conference: Conduct conference at Project site. Combine with preliminary roofing conference specified in Division 07 Section "Preparation for Reroofing".
1. Meet with Owner, Architect, 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 status of required submittals.
 5. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 6. Review structural loading limitations of roof deck during and after roofing.
 7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 8. Review governing regulations and requirements for insurance and certificates if applicable.
 9. Review temporary protection requirements for roofing system during and after installation.
 10. Review roof observation and repair procedures after roofing installation.
- P. If Contractor chooses to bid a substitute system, Contractor must bid specified system and submit separate bid for the substitute system. Substitute system must be identified publicly during the pre-bid conference to give all bidders equal opportunity. Bidding contractors proposing substitutes shall submit the following to Architect a minimum of 7 (seven) business days prior to bid date:
1. Written explanation of why the substitute system should be considered.
 2. Accredited third-party testing certifications showing that the physical and performance characteristics of the substitute system's products will meet or exceed those of the specified materials.
 3. A written summary detailing the comparison of the specified products and the proposed substitute products; including printed versions of all manufacturers' current product data sheets for all products being proposed or compared in the required summary.
 4. Smallest standard package of, and product data sheets for, all proposed substitute adhesives, coatings, mastics, sealants, tri-laminate ply sheets, granulated cap sheets and coatings.

5. Any proposed substitute system that the Architect deems as qualified to compete for the project will be acknowledged by written addendum before the bid date.
6. Voluntary alternate roofing systems, submitted by the low bid Contractor, without pre-approval acknowledged by the Architect through the published addendum process, may be rejected without cause by the Architect or Owner.

1.08 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.
- 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. Do not leave unused felts and other sheet materials on the roof overnight or when roofing work is not in progress unless protected from weather and moisture and unless maintained at a temperature exceeding 50 deg F.
- E. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.
- F. Contractor is responsible for the safekeeping of materials stored onsite.

1.09 PROJECT 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.
- B. Prevent dust, vapors, gases, and odors from entering into the building during roof installation. When shutting down or blocking air intakes, provide makeup air or additional intake air from sources away from the work area. Coordinate these procedures with owner's Representative.

1.10 WARRANTY

- A. Manufacturer's Roofing Warranty: Submit a written warranty, signed by the roofing system manufacturer agreeing to promptly repair any leaks in the roof membrane system resulting from defects in materials or workmanship including, but not limited to, roof plies and adhesive, base flashings, roof insulations and adhesives, wood components, fasteners, and all roof system metal components for the indicated warranty period.
 1. Manufacturer's 20-Year Systems Warranty.
 2. Indicate a wind speed warranty of 74 M.P.H., as reported by the certified weather reporting station nearest to the site for the Hastings on Hudson N.Y. region. Provide a sample copy of standard roofing manufacturer's warranty, stating obligations, remedies, limitations, and exclusions of warranty.
 3. Bidders to provide copy of the manufacturer's sample warranty, written as specified, with bid.

4. Inspections required by the manufacturer to provide this warranty shall be performed at no additional cost to the Owner.
 5. Warranty shall run for a continuous 20 years.
 6. Warranty will not be accepted that contains any requirement(s) for Owner to renew the warranty at any time during the 20 year period.
 7. In year(s) number 2, 5, 10 and 15 of this warranty, manufacturer shall provide roof inspections, and limited housekeeping services, at no additional charge.
 8. Upon successful completion of the work and prior to receipt of final payment, the manufacturer's warranty as stated above shall be issued to the Owner.
- B. Applicator/Roofing Contractor Warranty: Submit roofing installer's written warranty, signed by the installer, covering work of this section, including but not limited to, roof plies and adhesive, insulation layers, base flashings, roof insulations, wood components, fasteners, and all roof system metal components for two years from the date of substantial completion. The warranty shall guarantee material and workmanship for watertightness, weathertightness, and against all leaks. During the two-year period, the contractor shall respond and fix all reported leaks within 24 hours from time of notification, and fix all leaks without any cost to the Owner.
1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Manufacturer/Product: The roof system specified in this Section is based upon Tremco, Inc. products named in other Part 2 articles. Subject to compliance with requirements, provide the named product by one the following:
1. Tremco, Inc. (Basis of Design System)
 2. Viridian
 3. Garland
- B. Approved Manufacturer's tri-laminate base sheet:
1. Manufacturer / VB Tri-laminate Base Sheet
 - a. Tremco Inc. / BURmastic Composite Ply HT
 - b. Viridian / Multi-Ply Glass CL
 - c. Garland / HPR TriBase Premium
- C. Approved Manufacturer's white thermoplastic TPA/KEE roofing membrane, fleece- backed, 60 mil thickness:
1. Manufacturer / White Thermoplastic Roofing Membrane / Cold Adhesive
 - a. Tremco Inc. / Tremco TPA FB 60 mil / Fleece Back WB Single Ply Bonding Adhesive
 - b. Viridian Systems / HK 5001 / HK 5001 Bonding Adhesive
 - c. Garland Co., Commercial Innovations / SolarBrite FB 60 mil / SolarBrite FBWB Bonding Adhesive
- D. Approved Manufacturer's white thermoplastic TPA/KEE roofing membrane, fleece- backed, 60 mil thickness:
1. Manufacturer / White Thermoplastic Roofing Membrane / Hot Modified Adhesive
 - a. Tremco Inc. / Tremco TPA FB 60 mil / THERMastic 80
 - b. Viridian Systems / HK 5001 / BUR Plus 505
 - c. Garland Co., Commercial Innovations / SolarBrite FB 60 mil / Garlastic KM Plus
- E. Approved Manufacturer's Insulation Adhesive:
1. Manufacturer / Insulation Adhesive
 - a. Tremco Inc. / Low Rise Foam Insulation Adhesive BG
 - b. Viridian / Insulation Adhesive SF

- c. Garland / Insul-Lock HR

2.02 AUXILIARY ROOFING MEMBRANE MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Fabric-Reinforced Thermoplastic Membrane Field Sheet: (Tri-Polymer Alloy, Fabric- Backed) Thermoplastic single ply membrane, Elvaloy-modified, fabric reinforced and fabric backed, with the following properties per ASTM D751:
 - 1. Membrane Thickness: 60 mils, nominal.
 - 2. Tear Strength, 140 lbf MD, 100 lbf XMD
 - 3. Breaking Strength, 360 lbf MD, 390 lbf XMD
 - 4. Exposed Face Color: White.
- C. Sheet Flashing: Manufacturer's standard white, non-fleece-backed, 60 mil TPA/KEE sheet flashing with same reinforcement as thermoplastic roofing membrane.
- D. Drain Flashing: Manufacturer's non-reinforced white, non-fleece-backed, 55 mil TPA membrane for use at drains.
- E. TPA-Coated Metal Sheet: 24 gauge steel sheet with factory-applied TPA surface.
- F. Bonding Adhesive: Manufacturer's standard VOC-compliant water-based bonding adhesive for use at fleece backed membrane. Manufacturer's standard VOC- compliant bonding adhesive for use at flashing locations.
- G. Primers: Manufacturer's approved and VOC-compliant primers for cold and hot applications.
- H. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- I. Miscellaneous Accessories: Provide compatible pitch pocket sealers, water block sealants, preformed TPA/KEE cone and vent sheet flashings, preformed pipe flashings, preformed inside and outside corner sheet flashings, T-joint covers, sealants and other accessories.

2.03 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses required.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, HCFC- free, with felt or glass-fiber mat facer on both major surfaces.
 - 1. R-Value minimum continuous R-30.
 - 2. Tapered slopes as indicated on drawings.

2.04 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. Wood Nailers and Cants: Comply with recommendations in FMG Loss Prevention Data Sheet 1-49, including requirements for wood nailers and cants. Fibrous cants are not permitted.

- C. Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
- D. Provide preformed crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain.
 - 1. Crickets and saddles to have a minimum of double the slope of the insulation.
 - 2. Adhered crickets to be installed between all drains.
- E. Cover Board: Reinforced gypsum cover board to be one of the following:
 - 1. GP Gypsum Dens-Deck Prime: ASTM C 1177, glass-mat, water-resistant gypsum substrate, 1/2 inch thick, factory primed.
 - 2. USG Corporation; Securock: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, 1/2 inch thick.

2.05 WALKWAYS

- A. Thermoplastic Walkway Roll.
 - 1. 80 mils thick minimum; Gray, non fleece-backed, 36" width, serrated/slip- resistant surface.

2.06 METAL FLASHING MATERIALS

- A. See Division 07 Section "Sheet Metal Flashing and Trim" and "Roof Specialties" for custom metal roof penetration flashings, counter flashings and perimeter flashings.
- B. Other Metal Flashings:
 - 1. Metal flashings, counter flashings, pitch pans, scuppers, and like applications shall be in accordance with:
 - a. National Roofing Contractors Association Manual (NRCA).
- C. Termination Bar: Extruded aluminum bar x 2" wide x 10' lengths. Fastener spacing 8" o.c.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
 - 2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane relative to adjoining deck.
 - 4. Verify that substrate is visibly dry and free of moisture.
 - 5. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 - 6. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 7. 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. All roof top curbs, units, projections and wall flashings must be raised to allow finish roof system flashing height of eight inches.
- B. Remove all existing roofing, insulations, flashings and perimeter metal flashings down to roof deck.
- C. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- D. 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.
- E. Prevent dust, vapors, gases, and odors from entering into the building during roof installation. When shutting down or blocking air intakes, provide makeup air or additional intake air from sources away from the work area. Coordinate these procedures with owner's Representative.

3.03 INSTALLATION, GENERAL

- A. Install roofing system in accordance with manufacturer's recommendations.
- B. Comply with recommendations in FMG Loss Prevention Data Sheet 1-49, including requirements for wood nailers and cants.
- C. Begin the built up roof membrane system installation in the presence of roofing manufacturer technical (non-sales) personnel.
- D. Coordinate installation of roofing system components so insulation and roofing plies are not exposed to moisture or remain exposed at the end of the workday or when rain is forecast.
- E. Provide water cutoffs at the end of each day's work to cover exposed ply sheets and insulation with a course of coated felt with joints and edges sealed.
- F. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of the roofing system.
- G. Roofing system and building shall be water-tight at the end of each working day.
- H. Remove and discard temporary seals before beginning work on adjoining.
- I. Shingling Plies: Shingle membrane in direction to shed water.
- J. Cooperate with inspecting and testing agencies engaged or required to perform services for installing modified bitumen membrane roofing system.
- K. Install roofing system in accordance with NRCA Manual Plates and NRCA recommendations; modify as required to comply with requirements of FMG references above.
- L. Contractor shall erect all required roof barriers and safety lines as required by OSHA and comply with OSHA regulations for safety.

3.04 ROOF DRAINS

- A. General:
 - 1. Inspect roof drains at time of existing roof tear-off to ascertain requirements for repair and/or replacement of broken or missing parts.
 - 2. Provide temporary means of protecting roof drains from clogging of foreign material during construction. (E.g. inclement weather, weekends, holidays, etc.)
- B. Preparation:
 - 1. For all existing roof drain locations, remove all foreign material from body of drain, tailpiece, connecting piping, and roof leader.
 - 2. Flush through roof leaders to building drainage system to remove sediment and to test drain capacity.
 - 3. Verify that all roof drains are clear and free flowing, and attain Owner's site representative approval prior to commencement of work.
- C. Rework Roof Drains:
 - 1. Clean drain body of all bitumen and other contaminants.
 - 2. Set drain bowl to required height to allow for proper drainage and meet manufacturer's insulation requirements at drain.
 - 3. Fasteners: Coat all bolt threads with manufacturer's recommended permanent type lubricant to prevent freeze-up.
 - 4. Set membrane under new clamping ring in full bead of water stop mastic.
 - 5. Use bronze, brass or stainless steel machine bolts.
 - 6. Do not seal the new dome strainer to the drain body or clamping ring. It must be removable for future cleaning of the drain bowl or roof leader.
 - 7. Install new cast iron drain strainers. Plastic strainers are not permitted.

3.05 BASE SHEET INSTALLATION (AT LIGHTWEIGHT CONCRETE OVER TECTUM DECKS)

- A. Install one lapped base sheet course and mechanically fasten to substrate to meet wind uplift requirements, according to built-up roofing manufacturer's written instructions. Ensure fasteners do not penetrate through bottom of Tectum deck.

3.06 INSULATION INSTALLATION

- A. Prime concrete deck with required primer and allow primer to dry.
- B. Comply with roofing manufacturer's written instructions for installing roof insulation.
- C. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- D. Do not permit water to enter into or under existing membrane roofing system components that are to remain.
- E. Install tapered insulation and crickets, as indicated on drawings, to provide positive drainage.
- F. Install insulation with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- G. Install wood nailers to match insulation and cover board thicknesses. Attach to deck per FM 1-49.

- H. 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 1/8 inch with insulation.
 - 1. Cut and fit insulation within 1/8 inch of nailers, projections, and penetrations.
- I. Trim surface of insulation where necessary at roof drains so completed surface is flush with ring and does not restrict flow of water.
- J. Wood Cants: Install and secure preformed 45-degree wood cants at junctures of built-up roofing membrane system with vertical surfaces or angle changes greater than 45 degrees.
- K. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- L. Taper insulation to provide a 48" square sump at roof drains.
- M. Provide adhered crickets between drain locations and adhered saddles along walls between drains to ensure positive drainage.
- N. Adhered insulation: Set all insulation layers in ribbons/beads of specified insulation adhesive at the rate required by the manufacturer to meet the minimum field wind uplift pressures. Firmly press boards into place following manufacturer's written instructions.
 - 1. Increase adhesive application rate by 50% in roof perimeters and 75% in roof corners.

3.07 COVER BOARD INSTALLATION

- A. Install cover boards over all insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation by a minimum of 6 inches in each direction. Loosely butt cover boards together. Prime all non-factory-primed gypsum cover boards with asphalt primer and allow primer to dry.
 - 1. Set cover board in ribbons of the specified cold-applied insulation adhesive the rate required by the manufacturer to meet required wind uplift pressures. Firmly press boards into place following manufacturer's written instructions.
 - a. Increase adhesive application rate by 50% in roof perimeters and 75% in roof corners to meet specified wind uplift.
- B. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

3.08 ROOFING MEMBRANE INSTALLATION, GENERAL

- A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in NRCA's "Quality Control Guidelines for the Application of Thermoplastic Membrane Roofing".
- B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
- C. Cooperate with inspecting agencies engaged or required to perform services for installing roofing system.
- D. Coordinate installation of roofing so insulation and other components of built-up roofing not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 - 1. Provide tie-offs at end of each day's work to cover exposed built-up roofing sheets and insulation with a course of coated felt set in roofing cement with joints and edges sealed.

2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
 3. Remove and discard temporary seals before beginning work on adjoining roofing.
- E. Substrate-Joint Penetrations: Prevent adhesives from penetrating substrate joints, entering building, or damaging roofing components or adjacent building construction.

3.09 ADHERED MEMBRANE ROOFING INSTALLATION

- A. Fully adhere membrane roofing over area to receive roofing and install according to roofing system manufacturer's written instructions.
- B. Start installation of membrane roofing in presence of roofing system manufacturer's technical personnel.
- C. Mix bonding adhesive as required by manufacturer's written instructions.
- D. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Cold Bonding Adhesive: Apply to substrate at rate required by manufacturer and immediately install fleece backed membrane roofing into wet adhesive. Do not allow adhesive to dry before installing membrane. Ensure bonding adhesive does not contaminate TPA membrane surface or lap and seam areas. Roll-in membrane roofing to ensure a complete and positive bond.
- F. Hot Modified Asphalt: Apply to substrate at rate required by manufacturer and immediately install fleece backed membrane into hot modified adhesive. Do not allow adhesive to cool before installing membrane. Ensure adhesive does not contaminate TPA membrane surfaces or lap and seam areas. Roll in membrane roofing to ensure a positive and complete bond.
- G. In addition to adhering, turn field membrane up three inches and mechanically fasten membrane roofing securely at vertical terminations and penetrations at a spacing of 12 inches on center. Turn membrane down over wood blocking at perimeters and terminate membrane by fastening 12 inches on center into vertical face of wood blocking.
- H. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
- I. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane where required.
 2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
- J. Extend drain membrane flashing a minimum 1 inch down into drain bowl. Spread a full bed of compatible water block sealant bed over deck drain flange at roof drains and securely seal adhered TPA drain membrane flashing in place with clamping ring. Heat weld drain membrane flashing onto membrane roofing and seal edge with sealant.

3.10 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

- B. Apply flashing bonding adhesive to substrate and underside of sheet flashing at required rate to completely bond flashing to substrate. Do not apply to seam area of flashing to allow for heat welding at seams and laps. Firmly roll sheet flashings into the adhesive.
- C. Extend adhered flashings six (6) inches onto horizontal membrane roofing and heat weld to field membrane. Apply lap sealant to seal cut edges of sheet membrane.
- D. Seams: Clean seam areas, overlap membrane flashing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - 2. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
- E. Terminate and seal top of adhered sheet flashings and mechanically anchor to substrate 8" on center through termination bars and a compression seal of butyl tape.
- F. Cover flashing terminations with a metal counter flashing.
- G. Use manufactured corners for inside and outside base flashing corners.
- H. Contractor to fabricate pitch pockets, scupper flashings and stack flashings from TPA-coated metal. Seal all joints watertight with concealed water block sealant and heat weld TPA membrane stripping from membrane onto TPA coated metal flashings.
- I. Complete all flashing details in accordance with attached drawings and to meet manufacturer's warranty requirements. Complete details to meet FM 1-49 approval requirements utilizing wood nailers and cants.

3.11 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway roll products at roof access locations, beneath all sleeper and equipment supports and at other areas as indicated on drawings or required by roofing manufacturer. Heat weld to roofing membrane substrate according to roofing system manufacturer's written instructions.

3.12 FIELD QUALITY CONTROL

- A. Manufacturer's Technical Representative must inspect roof installation every other day, on days where roofing work is taking place, and report progress to Owner's representative.
- B. To ensure roofing inspections are not missed or overlooked, the installing contractor shall notify the roofing manufacturer's technical inspector by phone, each and every morning, before work begins on the project. Technical inspector shall make his/her cell phone number available to the installing contractor at the beginning of the project.
- C. Inspection Reports: Provide progress photos for application of each operation of roofing system. In addition to regular inspections, Manufacturer's Technical (non-sales) Representative shall be present for roof work starts at each section. Manufacturer's Technical Representative shall provide proof of no less than 10 years experience in the Roofing Industry.
- D. Roofing Inspector Qualifications: A full time technical representative of manufacturer (non-sales) experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article,

to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification.

1. The Roofing Inspector shall be one of the following:
 - a. An authorized full-time technical employee of the manufacturer with 10 years experience in commercial roofing.
 - b. If manufacturer does not employ full time technical personnel, inspection personnel shall be certified as a Registered Roof Observer by the Roof Consultants Institute, and shall be experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project.
- E. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
 1. Manufacture shall verify watertightness of roof system by performing a nondestructive infrared or Tramex dielectric moisture survey.
 2. Notify Architect or Owner 48 hours in advance of date and time of inspection.
 3. Results will be made available to owner's representative in written form. Any defects or entrapped moisture found within the new roofing system installation will be removed and replaced at the installing contractor's expense.
- F. Installing contractor to repair or remove and replace components of roofing system, at the sole expense of the installing contractor, where test results or inspections indicate that they do not comply with specified requirements.
- G. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.13 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will 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 roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Sequence operations to avoid excessive or concentrated foot traffic and storage over roof areas while they cure.
- D. 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 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. Base and Counter flashing.

1.03 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.04 REFERENCES:

- A. ASTM B209 - Specification for Aluminum Sheet
- B. ASTM B32 - Standard Specification for Solder Metal
- C. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction.
- D. SMACNA (ASMM) - Architectural Sheet Metal Manual

1.05 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 each manufactured product and accessory.
- B. Shop Drawings: For sheet metal flashing and trim.
 - 1. Detail fabrication and installation layouts, details. Distinguish between shop- and field-assembled work.
 - 2. Include identification of material, thickness, weight, and finish for each item and location in Project.
 - 3. Include details for forming, including profiles, shapes, seams, and dimensions.
 - 4. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 - 5. Include details of termination points and assemblies.
 - 6. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
 - 7. Include details of roof-penetration flashing.
 - 8. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 - 9. Include details of special conditions.
 - 10. Include details of connections to adjoining work.
- C. Samples for Verification: For each type of exposed finish.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For each type of coping, scupper, roof edge and flashing required to complete the roofing system. All sheet metal shall be SPRI ES-1 tested and FM approved for this project.
- C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.07 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 - 1. For copings and roof edge flashings that are SPRI ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
- C. Perform work in accordance with SMACNA (ASMM), CDA A4050, and approved manufacturers requirements and standard details, except as otherwise indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.09 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated or required by the approved roofing manufacturer responsible for providing the Total System Warranty for the roof system..
- C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- D. FM Approvals Listing: Manufacture and install copings roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-180 Identify materials with name of fabricator and design approved by FM Approvals.
- E. SPRI Wind Design Standard: Manufacture and install copings, scuppers, roof edges, flashings and other roof metal work tested according to SPRI ES-1 and capable of resisting the required design pressure:
- F. Verify type of metal being utilized for the project
- G. Recycled Content of Copper-Sheet Flashing and Trim: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 40 percent.
- H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material

2.02 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper, natural finish, 16 oz. / s.f. (24 gage) minimum.
 - 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. Hussey Copper Ltd
 - b. Revere Copper Products, Inc
 - c. Or approved equal.
 - 2. Non-patinated Exposed Finish: Mill.
- C. Aluminum Sheet: ASTM C209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. Thickness: 0.063 inch minimum.
 - 2. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3. Color: As selected by Architect from manufacturer's full range of Kynar 500 colors and anodized colors..

4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

D. Stainless Steel: ASTM A666, Type 304, soft temper, 28 gage thick; smooth No. 4 finish.

2.03 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment 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. Grace Construction Products, a unit of W. R. Grace & Co.-Conn; Grace Ice and Water Shield HT .
 - b. Henry Company; Blueskin PE200 HT.
 2. Thermal Stability: ASTM D1970/D1970M; stable after testing at 240 deg F or higher.
 3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.

2.04 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item. Installations shall conform to
 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 2. Fasteners for Copper Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.
 3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- C. Solder:
 1. For Copper: ASTM B32, with maximum lead content of 0.2 percent.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C920, elastomeric polyurethane silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

2.05 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- G. Seams: Fabricate non-moving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

2.06 ACCESSORIES:

- A. Corners, end caps, pier caps, etc. shall be fabricated by the coping manufacturer.
- B. Welded assembly shall be used to maintain watertight integrity.

2.07 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
 - 1. Aluminum Sheet: 0.063 inch thick. Finish color as selected by the Architect.

2.08 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.
- B. Apply slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

3.03 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 - 5. Torch cutting of sheet metal flashing and trim is not permitted.
 - 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.

2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
- E. Seal joints as required for watertight construction.
 1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 - JOINT SEALANTS.
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
 1. Do not solder aluminum sheet.
 2. Do not use torches for soldering.
 3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

3.04 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements and related section 075323, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches. Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.05 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 4.
- C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 6 inches beyond wall openings.

3.06 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.07 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.08 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that 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. Roof curbs.
 - 2. Equipment supports.
 - 3. Pipe supports.
 - 4. Preformed flashing sleeves.

1.03 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

1.05 INFORMATIONAL SUBMITTALS

- 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, ductwork, piping, and conduit.
 - 4. Required clearances.
- B. Warranty: Sample of special warranty.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.07 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.08 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 METAL MATERIALS

- A. Aluminum Sheet: ASTM B209, 0.063 inch thickness or as indicated, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
 - 1. Mill Finish: As manufactured.
 - 2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
 - 3. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.
- B. Stainless-Steel Sheet and Shapes: ASTM A240/A240M or ASTM A666, Type 304.
- C. Galvanized-Steel Tube: ASTM A500/A500M, round tube, hot-dip galvanized according to ASTM A123/A123M.

2.02 ROOF CURBS

- A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, stepped integral metal cant raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of 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. Thybar Corporation
 - b. Greenheck Fan Corporation
 - c. Pate Company (The)
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Material: Aluminum sheet, 0.090 inch thick airtight and watertight welded corners.
 - 1. Insulation: 1 1/2 inch thick, 3 lb density rigid insulation.
 - 2. Height: 12 inch minimum above deck or as indicated.
 - 3. Curb Type: TC-2 (Cant - no shoulder)

D. Construction:

1. Liner: Same material as curb, of manufacturer's standard thickness and finish.
2. Fabricate curbs to minimum height of 12 inches above roof elevation unless otherwise indicated.
3. Top Surface: Level around perimeter with roof slope accommodated by sloping the deck-mounting flange. Contractor to field verify roof conditions prior to ordering curb.

2.03 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, provide products by one of 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. Thybar Corporation
 - b. Greenheck Fan Corporation
 - c. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc
 - d. Pate Company (The)

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported. Curb shall span a minimum of two structural supports and shall cantilever a maximum of 12 inches where necessary.

C. Loads: Coordinate and verify load requirements with approved manufacturer's Product Data for each piece of equipment requiring support.

D. Material: Aluminum sheet, 0.090 inch thick, airtight and watertight welded corners . Internally reinforced with bulkheads at 24 inches on center, 2 inch x 4 inch wood nailer with 18 gauge flashing cover.

1. Insulation: 1 1/2 inch thick, 3 lb density rigid insulation.
2. Height: 12 inch minimum above deck or as indicated.
3. Curb Type: TEMS-2 (Cant - no shoulder)

E. Construction:

1. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
2. Fabricate equipment supports to minimum height of 12 inches unless otherwise indicated.
3. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.
4. Security Grille: Provide where indicated.

2.04 PIPE SUPPORTS

A. Pipe Supports: Adjustable-height, extruded-aluminum tube, filled with urethane insulation; 2 inches in diameter; with aluminum baseplate, EPDM base seal, manufacturer's recommended hardware for mounting to structure or structural roof deck as indicated, and extruded-aluminum carrier assemblies; suitable for quantity of pipe runs and sizes.

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:
2. Pipe Support Height: As indicated on Drawings.

3. Roller Assembly: With stainless-steel roller, sized for supported pipes.
4. Pipe Support Flashing: Manufacturer's standard insulated sleeve flashing with integral base flange; aluminum sheet, 0.063 inch (1.60 mm) thick.
5. Finish: Manufacturer's standard.

2.05 PREFORMED FLASHING SLEEVES

- A. Exhaust Vent Flashing: Double-walled metal flashing sleeve or boot, insulation filled, with integral deck flange, 12 inches (300 mm) high, with removable metal hood and slotted metal collar.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Custom Solution Roof and Metal Products
 - b. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc
 2. Metal: Aluminum sheet, 0.063 inch (1.60 mm) thick.
 3. Diameter: As indicated.
 4. Finish: Manufacturer's standard.
- B. Vent Stack Flashing: Metal flashing sleeve, uninsulated, with integral deck flange.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of 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. Custom Solution Roof and Metal Products
 - b. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc
 3. Metal: Aluminum sheet, 0.063 inch (1.60 mm) thick.
 4. Height: 18 inches (457.2 mm).
 5. Diameter: As indicated.
 6. Finish: As selected by the Architect from the manufacturer's full line of finishes.

2.06 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
1. Coat concealed side of stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.
 3. Bed flanges in thick coat of roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Roof Curb Installation: Install each roof curb so top surface is level.
- D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.
- E. Pipe Support Installation: Install pipe supports so top surfaces are in contact with and provide equally distributed support along length of supported item.
- F. Preformed Flashing-Sleeve Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions.
- G. Seal joints with butyl sealant as required by roof accessory manufacturer.

3.03 REPAIR AND CLEANING

- A. Clean exposed surfaces according to manufacturer's written instructions.
- B. Clean off excess sealants.
- C. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The work covered by this specification consists of furnishing all labor, equipment, materials and accessories, and performing all operations required for the correct installation of non-penetrating, recycled rubber rooftop supports for piping and ductwork systems.

1.02 REFERENCES

- A. ASTM A653 G90 SS Gr. 33 - Specification for Steel Sheet, Zinc Coated (Galvanized) by the Hot Dipped Process
- B. ASTM B633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel
- C. ASTM C531 – Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts, Monolithic Surfaces, and Polymer Concretes
- D. ASTM C642 – Test Method for Specific Gravity, Absorption, and Voids in Hardened Concrete
- E. ASTM C672 – Test Methods for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals
- F. ASTM D412 – Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension
- G. ASTM D395 – Standard Test Methods for Rubber Property – Compression Set
- H. ASTM D573 – Test Method for Rubber – Deterioration in an Air Oven
- I. ASTM D746 – Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
- J. ASTM D2240 – Test Method for Rubber Property – Durometer Hardness
- K. NFPA 70 – National Electrical Code

1.03 QUALITY ASSURANCE

- A. Rubber / steel pipe supports shall be manufactured under a strict quality control program assuring quality product delivered to the jobsite. Pipe supports that are damaged shall not be installed.
- B. Workmanship: All rooftop supports to be installed by a qualified contractor and installed in accordance with manufacturer's recommendations.
 - 1. All work shall comply with all applicable federal, state, and local codes and laws having jurisdiction.
 - 2. All work shall conform to accepted industry and trade standards for pipe, and ductwork installations.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with these specifications, rooftop support systems shall be Dura-Blok™ design as supplied by Eaton or approved equal.

2.02 MATERIALS

- A. Curb base shall be made of 100% recycled rubber and polyurethane prepolymer with a uniform load capacity of 500 pounds per linear foot of support*. In addition, each base to have a reflective red stripe. (*See 3.01(C))
- B. Steel frame: Steel, strut galvanized per ASTM A653 or strut galvanized per ASTM A653 for bridge series.
- C. Attaching hardware: Zinc-plated threaded rod, nuts and attaching hardware per ASTM B633.
- D. Rooftop support system products shall meet or exceed the physical and performance characteristics as specified below:
 - 1. Density: 0.52 oz/cu in. ASTM D575
 - 2. Durometer Hardness: 67.2A ± 1. ASTM D575
 - 3. Tensile Strength: 231 psi minimum. ASTM D575
 - 4. Compression Deformation: 5% at 70psi and 72°F. ASTM D395
 - 5. Brittleness at Low Temp: -50°F. ASTM D746
 - 6. Weathering: 70 HOURS AT 120°F. ASTM D573
 - a. Hardness Retained: 100% (±5%)
 - b. Compressive strength: 100% (±5%)
 - c. Tensile strength: 100% (±5%)
 - d. Elongation retained: 100% (±5%)

2.03 TYPE OF ROOFTOP SUPPORTS

- A. Continuous block channel pipe supports – Dura-Blok™ DB6-Series; Support shall consist of a 6 inch wide by 5 inch high rubber base with length of 9.6 inch length. 12 ga. galvanized channel. Standard strut accessories shall be used for attachment. Length of support shall extend a minimum of 2-inches from each side of the pipe(s) supported. Exact length to be coordinated in field. Assembly shall have 1" gaps between blocks for free flow of water.
- B. Extendable height pipe support – Dura-Blok™ model DBE 10-12, height to suit application: 12 inch (200 pound maximum load). Support shall consist of a 4-inch high rubber base with two (2) ½"-13 electro zinc all threaded rod risers and a 1" high galvanized slotted channel. Length of support to extend a minimum of 2-inches from each side of the pipe supported. Consult manufacturer as heavier loads may require CLDP load distribution plate.
- C. Fixed height roller pipe supports– Dura-Blok™ DBR Series; Support shall consist of a 4-inch high rubber base with 1" high galvanized channel and a pipe roller assembly. Coordinate selection of support with manufacturer to accommodate size of pipe to be installed. Roller supports shall be available in the following pipe sizes: 2" to 3 1/2", 4" to 6", 8" to 10", 12" to 14", 16" to 20". Support shall raise the pipe a minimum of 6" above the roof measured to bottom of supported pipe.
- D. Adjustable height roller pipe supports– Dura-Blok™ DBR10 Series; Support shall consist of a 4-inch high rubber base with two (2) ½"-13 electro zinc all threaded rod risers and a B3114-3-1/2" pipe roll with sockets. Support shall be suitable for pipe up to 3-1/2 inches, with vertical adjustment up to 12 inches.
- E. Elevated single pipe supports– Dura-Blok™ DBM Series; Support shall consist of a 4-inch high rubber base with one (1) 3/8"-16 electro zinc all threaded rod and a hinged pipe clamp. Supports shall be available in pipe sizes ranging from ½" to 2" and be suitable for supporting steel pipe or copper tubing. Coordinate clamp type with pipe material to be installed. Support shall raise the pipe approximately 11" above the roof measured to bottom of supported pipe.

- F. Adjustable pipe supports for installations over 12" in height – Dura-Blok™ DB_DS Series; Support shall consist of two (2) 4-inch high rubber bases with 1" high galvanized channels and SH style riser channels. Riser channels shall be 1-5/8" x 1-5/8" x 12 ga. Support shall be capable of vertical adjustments between 12" and 50" measured to top of horizontal support channel.
- G. Adjustable duct supports – Dura-Blok™ DB_DS Series; Support shall consist of two (2) 4-inch high rubber bases with 1" high galvanized channels and SH style riser channels. Riser channels shall be 1-5/8" x 1-5/8" x 12 ga. Support shall be capable of vertical adjustments between 12" and 50" measured to top of horizontal support channel.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations. Coordinate overall dimensions of supports and pipe/duct to be supported in field with manufacturer prior to ordering.
- B. Piping shall be elevated not less than 12 inches above the roof surface.
- C. Ductwork shall be elevated not less than 30 inches above the roof surface.
- D. Consult roofing manufacturer for roof membrane compression capacities. Install a compatible sheet of roofing material (rubber pad) under rooftop support to disperse concentrated loads and add further membrane protection.
- E. Support gas piping at intervals not exceeding the spacing specified in the Table below in accordance with the New York State Fuel Gas Code.

Steel Pipe, Nominal Size of Pipe (Inches)	Maximum Horizontal Spacing of Supports (Feet)
1/2	6
3/4 or 1	8
1-1/4 or Larger	10

- F. Support hydronic piping systems at intervals not exceeding the spacing specified in the Table below in accordance with the New York State Mechanical Code, or in accordance with ANSI/MSS SP-58. Hydronic piping systems shall include steam, hot water, chilled water, steam condensate, and ground source heat pump loop systems.

Piping Materials	Maximum Horizontal Spacing of Supports (Feet)
ABS Pipe	4
Aluminum Pipe and Tubing	10
Cast-Iron Pipe	5
Copper or Copper-Alloy Pipe	12
Copper or Copper-Alloy Tubing	8
CPVC Pipe or Tubing, 1-Inch and Smaller	3
CPVC Pipe or Tubing, 1-1/4 Inches and Larger	4
Lead Pipe	Continuous

PB Pipe or Tubing	2-2/3 (32 Inches)
PE-RT, 1-Inch and Smaller	2-2/3 (32 Inches)
PE-RT, 1-1/4 Inches and Larger	4
PEX Tubing, 1-Inch and Smaller	2-2/3 (32 Inches)
PEX Tubing, 1-1/4 Inches and Larger	4
Polypropylene (PP) Pipe or Tubing, 1-Inch and Smaller	2-2/3 (32 Inches)
Polypropylene (PP) Pipe or Tubing, 1-1/4 Inches and Larger	4
PVC Pipe	4
Steel Tubing	8
Steel Pipe	12

- G. Support ductwork in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible.
- H. Use properly sized clamps to suit pipe and conduit sizes.

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 014500 - 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

- 3.12 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" wide by 6" 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. Product Data: For each joint-sealant product indicated.
- B. 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.
- C. 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-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 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 C 1247. 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.

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 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. Pecora Corporation; 301 NS
 - c. Sika Corporation, Construction Products Division; SikaSil-WS 290
 - d. Tremco Incorporated; Spectrem 1.
- B. Single-Component, Non-sag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, for Use T.
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Pecora Corporation; 311 NS.

- b. Tremco Incorporated; Spectrem 800.
- C. Single-Component, Pourable, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade P, Class 100/50, for Use T.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 890-SL.
 - b. Pecora Corporation; 310 SL.
 - c. Tremco Incorporated; Spectrem 900 SL.
- D. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Tremco Incorporated; Tremsil 200.
 - b. Pecora Corporation; 898.
 - c. Or Approved Equal.

2.03 POLYURETHANE JOINT SEALANTS

- A. Single-Component, Non-sag, Polyurethane Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Sika Corporation, Construction Products Division; Sikaflex - 15LM.
 - b. Tremco Incorporated; Dymonic 100.
 - c. Or approved Equal.
- B. Single-Component, Nonsag, Traffic-Grade, Polyurethane Joint Sealant: ASTM C920. Type S, Grade NS, Class 25, for Use T.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Masterseal NP1.
 - b. Sika Corporation, Construction Products Division; Sikaflex - 1a.
 - c. Tremco Incorporated; Vulkem 116, Dymonic FC.
- C. Single-Component, Pourable, Traffic-Grade, Polyurethane Joint Sealant: ASTM C920, Type S, Grade P, Class 25, for Use T.
 - 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 Building Systems; MasterSeal SL 1.
 - b. Pecora Corporation; Urexpan NR-201.
 - c. Sherwin-Williams Company, Loxon SL1 Self-Leveling.
 - d. Sika Corporation. Construction Products Division; Sikaflex - 1CSL.
 - e. Tremco Incorporated; Vulkem 45.
- D. Immersible Multicomponent, Nonsag, Traffic-Grade, Polyurethane Joint Sealant: ASTM C920, Type M, Grade NS, Class 25, for Uses T and I.
 - 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 Building Systems; MasterSeal NP 2.
 - b. Pecora Corporation; Dynatred.
 - c. Tremco Incorporated; THC 901.

2.04 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 Building Systems; Sonolac.
- b. Bostik, Inc.; Chem-Calk 600.
- c. Pecora Corporation; AC-20+.
- d. Tremco Incorporated; Tremflex 834.
- e. Sherwin Williams Company (SherMax Urethanized Elastomeric Sealant).

2.05 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. Dayton Superior Specialty Chemicals; Polytite Standard.
 - d. Sandell Manufacturing Co., Inc.; Polyseal.

2.06 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard non-sag, paintable, non-staining 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.

2.07 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.

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. Joint Locations:
 - a. Control and expansion joints in paver and pavement installations.
 - b. Isolation and contraction joints in cast-in-place concrete slabs.
 - c. Tile control and expansion joints.
 2. Silicone Joint Sealant: Single component, non-sag, traffic grade, neutral curing.
 3. Polyurethane Joint Sealant: Single component, non-sag, traffic grade Single component, pourable, traffic grade.
 4. Preformed Joint Sealant: Preformed foam sealant.
 5. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion.
 1. Joint Locations:
 - a. Joints in pedestrian plazas.
 2. Polyurethane Joint Sealant: Immersible, multicomponent, non-sag, traffic grade.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal non-traffic surfaces.
 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints in dimension stone cladding.
 - d. Joints between metal panels.
 - e. Joints between different materials listed above.
 - f. Perimeter joints between materials listed above and frames of doors windows and louvers.
 - g. Control and expansion joints in ceilings and other overhead surfaces.
 2. Silicone Joint Sealant: Single component, non-sag, neutral curing, Class 100/50.

3. Polyurethane Joint Sealant: Single component, non-sag, Class 100/50.
 4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in tile flooring.
 2. Polyurethane Joint Sealant: Single component, non-sag, traffic grade.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. 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. Joint Sealant: Latex Acrylic based.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. 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. Joint Sealant: Mildew resistant, single component, non-sag, neutral curing, Silicone.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- G. 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 kept 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 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 wall expansion control systems.

1.03 ACTION SUBMITTALS

- A. Shop Drawings: For each expansion control system specified. Include plans, elevations, sections, details, splices, blackout requirement, attachments to other work, and line diagrams showing entire route of each expansion control system. Where expansion control systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
- B. Samples: For each exposed expansion control system and for each color and texture specified, full width by 6 inches (150 mm) long in size.
- C. Product Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
 - 1. Manufacturer and model number for each expansion control system.
 - 2. Expansion control system location cross-referenced to Drawings.
 - 3. Nominal joint width.
 - 4. Movement capability.
 - 5. Classification as thermal or seismic.
 - 6. Materials, colors, and finishes.
 - 7. Product options.

1.04 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each fire barrier provided as part of an expansion control system, for tests performed by a qualified testing agency.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. General: Provide expansion control systems of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.
 - 1. Furnish units in longest practicable lengths to minimize field splicing. Install with hairline mitered corners where expansion control systems change direction or abut other materials.
 - 2. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion control systems.
- B. Coordination: Coordinate installation of exterior wall expansion control systems with roof expansion control systems to ensure that wall transitions are watertight. Roof expansion joint assemblies are specified elsewhere.

2.02 EXTERIOR WALL EXPANSION CONTROL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Balco, Inc.
 - 2. Construction Specialties, Inc.
 - 3. EMSEAL Corporation.
 - 4. MM Systems Corporation.
 - 5. Watson Bowman Acme Corp.; a BASF Construction Chemicals business.
- B. Wall-to-Wall _____:
 - 1. Design Criteria:
 - a. Nominal Joint Width: Existing.
 - 2. Type: Cover plate.
 - a. Metal: Aluminum.
 - 1) Finish: Clear anodic, Class II.
 - 3. Type: Preformed cellular foam.
 - a. Foam Material: Manufacturer's standard.
 - 1) Color: As selected by Architect from manufacturer's full range.
- C. Wall Corner _____:
 - 1. Design Criteria:
 - a. Nominal Joint Width: Existing.
 - 2. Type: Cover plate.
 - a. Metal: Aluminum.
 - 1) Finish: Clear anodic, Class II.
 - 3. Type: Preformed cellular foam.
 - a. Foam Material: Manufacturer's standard.
 - 1) Color: As selected by Architect from manufacturer's full range.

2.03 MATERIALS

- A. Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063-T5 for extrusions; ASTM B 209 (ASTM B 209M), Alloy 6061-T6 for sheet and plate.
 - 1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
- B. Elastomeric Seals: ASTM E 1783; preformed elastomeric membranes or extrusions to be installed in metal frames.
- C. Cellular Foam Seals: Extruded, compressible foam designed to function under compression.
- D. Elastomeric Concrete: Modified epoxy or polyurethane extended into a prepackaged aggregate blend, specifically designed for bonding to concrete substrates.
- E. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to meet performance criteria for required fire-resistance rating.
- F. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
- G. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

2.04 GENERAL FINISH REQUIREMENTS

- 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: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.05 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces where expansion control systems will be installed for installation tolerances and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare substrates according to expansion control system manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion control systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion control systems.

3.03 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing expansion control systems and materials unless more stringent requirements are indicated.
- B. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
 - 1. Provide in continuous lengths for straight sections.
 - 2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 - 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- C. Foam Seals: Install with adhesive recommended by manufacturer.
- D. Terminate exposed ends of expansion control systems with field- or factory-fabricated termination devices.

3.04 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over expansion control systems. Reinstall cover plates or seals prior to Substantial Completion of the Work.

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 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. This Section references specification sections relating to commercial door hardware for the following:
 - 1. Swinging doors.
- B. Commercial door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Cylinders specified for doors in other sections.

1.03 RELATED REQUIREMENTS

- A. Section 013100 - PROJECT MANAGEMENT AND COORDINATION: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.
- B. Section 017800 - CLOSEOUT SUBMITTALS: Project record documents, operation and maintenance (O&M) data, warranties and bonds.
- C. Section 087100 - DOOR HARDWARE.

1.04 CODES AND REFERENCES

- A. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ICC A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC (IBC) - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.
 - 6. NFPA 105 - Installation of Smoke Door Assemblies.
 - 7. State Building Codes, Local Amendments.
- B. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.
 - 1. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
 - 2. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
 - 3. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2019.
 - 4. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
 - 5. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.

1.05 SUBMITTALS

- A. See Section 013100 - PROJECT MANAGEMENT AND COORDINATION and 013300 - SUBMITTALS, for submittal procedures.

- B. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- C. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 - 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- D. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.
- E. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.
- G. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.06 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

- B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor in good standing by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- D. Source Limitations: Obtain each type and variety of Door Hardware specified in the Related Sections from a single source, qualified supplier unless otherwise indicated.
- E. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ICC A117.1 requirements and guidelines as directed in the applicable model building code.
- F. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.08 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.09 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1.10 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

1.11 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

- A. Refer to "PART 3 – EXECUTION"

PART 3 EXECUTION

3.01 DOOR HARDWARE SETS

- A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should 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 and functionality.
- B. The supplier is responsible for handing and sizing all products as listed in the door hardware sets. Quantities listed are for each pair of doors, or for each single door.
- C. Products listed in the Door Hardware Sets must meet the requirements described in the specification sections noted.
 - 1. Section 087100 - DOOR HARDWARE

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 hollow-metal doors, fixed panels and frames.

1.03 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.04 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.
 - 8. Details of moldings, removable stops, and glazing.
 - 9. Details of conduit and preparations for power, signal, and control systems.
- C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.06 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

- C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ceco Door Products; an Assa Abloy Group company.
 - 2. Curries Company; an Assa Abloy Group company.
 - 3. Karpen Steel Custom Doors & Frames.
 - 4. Steelcraft; an Ingersoll-Rand company.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.02 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.03 INTERIOR DOORS AND FRAMES

- A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra Heavy-Duty Doors and Frames: SDI A250.8 - Level 3 At locations indicated in the Door and Frame Schedule.
 - 1. Physical Performance: Level B according to ANSI/SDI A250.4.
 - 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1 3/4 inches.
 - c. Face: cold-rolled steel sheet, minimum thickness of 0.053 inch (16 gauge) (Level 3).
 - d. Edge Construction: Model 1, Full Flush.
 - e. Core Materials: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.
 - 3. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch (14 gauge) (Level 4).
 - b. Construction: Full Profile Weld Type.
 - 4. Exposed Finish: Prime.

2.04 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 - 3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.05 MATERIALS

- A. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- C. Frame Anchors: ASTM A879/A879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M, hot-dip galvanized according to ASTM A153/A153M, Class B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.
- E. Grout: ASTM C476, except with a maximum slump of 4 inches, as measured according to ASTM C143/C143M.
- F. Glazing: Comply with requirements in Section 088000 - GLAZING
- G. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.06 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
 - 1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
 - 2. Fire Door Cores: As required to provide fire-protection ratings indicated.
 - 3. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
 - 4. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.

5. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.
- C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 6. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
 7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
 8. Terminated Stops: Terminate stops 6 inches above finish floor with a 45 degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.
- D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
 1. Reinforce doors and frames to receive non-templated, mortised, and surface-mounted door hardware.
 2. Comply with applicable requirements in ANSI/SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

- F. Stops and Frame Moldings: Provide beveled stops and frame moldings around glazed lites and louvers where indicated. Form corners of interior stops and moldings with mitered hairline joints. Exterior frame moldings shall be welded and ground smooth prior to priming.
 - 1. Single Glazed Lites: Provide beveled fixed stops and moldings welded on secure side of hollow-metal work.
 - 2. Multiple Glazed Lites: Provide beveled fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 3. Provide beveled fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 4. Frame profiles shall be beveled unless indicated otherwise on the drawings.
 - 5. Provide beveled loose stops and moldings on inside of hollow-metal work.
 - 6. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.07 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.08 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that will be filled with grout containing anti-freezing agents.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
 8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Steel Doors:
 - a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
 - c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
 - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.
- D. Glazing: Comply with installation requirements in Section 088000 - GLAZING and with hollow-metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.04 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal frames for non-hollow metal doors.
- B. Fire-rated hollow metal frames for non-hollow metal doors.
- C. Interior glazed borrowed lite frames.

1.02 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2018.
- G. 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.
- H. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.
- I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- J. ITS (DIR) - Directory of Listed Products; current edition.
- K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- M. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2007.
- N. NFPA 80 -Standard for Fire Doors and Other Opening Protectives; 2013
- O. UL (DIR) - Online Certifications Directory; Current Edition.
- P. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; 2009

1.03 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.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

1.05 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 DESIGN CRITERIA

- 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 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. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 - 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 gage, 0.053 inch, minimum.
- C. 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 gage, 0.053 inch, minimum.
 - 2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C or NFPA 252 ("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: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is 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. 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 to be installed in masonry or to be grouted, with bituminous coating, prior to installation.
- B. 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. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Coordinate installation of glazing.
- F. Coordinate installation of hardware.
- G. Coordinate installation of electrical connections to electrical hardware items.

3.04 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

3.05 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

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. Factory finishing flush wood doors.
 - 3. Factory fitting flush wood doors to frames and factory machining for hardware.
 - 4. 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.

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.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Eggers Industries
 2. Graham Wood Doors; an Assa Abloy Group company
 3. Marshfield - Algoma; a Masonite company
- 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 core specified or mineral core as needed to provide fire-protection 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.
- 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.

2.03 VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
1. Grade: Premium with Grade A faces.
 2. Species: Maple.
 3. Cut: Plain Sliced.
 4. Match between Veneer Leaves: Book match.
 5. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
 6. Exposed Vertical and Top Edges: Same species as faces - edge Type A.
 7. Core: Either glued wood stave or structural composite lumber.
 8. 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.
 9. WDMA I.S. 1A1-A Performance Grade: Extra Heavy Duty.

2.04 LIGHT FRAMES AND LOUVERS

- A. Wood-Veneered 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: Maple, finish to match door face panels.
 - 2. or approved equal.
- B. Metal Vision Light Frames for Fire Rated Doors: 18 and 20 gauge cold rolled steel, Custom Color Baked Enamel finish, Type M4 as per WDMA I.S. 1A as manufactured by one of the following:
 - 1. Anemostat Door Products; LoPro Metal Vision Frames for 1/4" or 5/16" glazing and StormPro-HR Hurricane Rated Metal Vision Frame.
 - 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. 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 - GLAZING.
 - 3. Louvers: Factory install louvers in prepared openings.

2.06 FACTORY FINISHING

- 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 that are indicated to receive transparent finish.
- C. 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) and TR-4/OP-4 (Heavy-Duty) catalyzed polyurethane.
 - 4. Staining: As selected by Architect from manufacturer's full range.
 - 5. Effect: Semi-filled finish, produced by applying an additional finish coat to partially fill the wood pores or as selected by the architect.
 - 6. 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: For installation, see Section 087100 - DOOR HARDWARE.
- 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, provide 1/4 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 SECTION INCLUDES

- A. Stile and Rail Wood doors and transom panels; glazed and non-glazed configuration; fire-rated and non-rated.

1.02 RELATED SECTIONS

- A. Section 087100 - DOOR HARDWARE.

1.03 REFERENCES

- A. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2019.
- B. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.
- C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.
- D. ASTM E152 - Methods of Fire Tests of Door Assemblies.
- E. AWI - Quality Standards of the Architectural Woodwork Institute.
- F. WDMA - National Wood Window and Door Association
- G. Intertek Testing Services - Warnock Hersey - Fire Tests of Door Assemblies.

1.04 DOOR AND PANEL DESCRIPTION

- A. Interior Doors (Non-rated): 1-3/4 inches thick; stile and rail construction.
- B. Interior Doors (Fire-Rated): 1-3/4 inches thick; stile and rail construction, forty-five (45) minute rated
- C. Paneling: Species to be same as door

1.05 SUBMITTALS

- A. Submit under provisions of Section 013300 - SUBMITTALS.
- B. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, identify cutouts for glazing and louvers.
- C. Product Data: Indicate door core materials and construction; veneer species, type and characteristics; factory machining criteria, factory finishing criteria and hardware preparations and labeling requirements.
- D. Samples: Submit one sample of door construction, 10 x 10 inch in size cut from top or bottom corner of door.
- E. Samples: Submit set of three samples of door veneer, 8 x 10 inch in size illustrating wood , stain and sheen color variation.]

1.06 REGULATORY REQUIREMENTS

- A. Fire Door Construction: Conform to ASTM E152, NFPA 252, Warnock Hersey International.
 - 1. Doors constructed to meet UL-10-C.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 016500 - PRODUCT DELIVERY, STORAGE AND HANDLING and manufacturer's instructions.
- B. Accept doors on site in manufacturer's standard packaging. Inspect for damage upon receipt.
- C. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges if stored more than one week.
- D. Break seal on packages while at site to permit ventilation.
- E. If any door is to be field finished, the total surface of the door must be fully block sanded in a horizontal position with 150 to 180 grit sandpaper to remove all grain raise, handling marks, damage or other residual attributes and to soften compressed wood grain, leaving uniformly prepared surfaces before any stain is applied.

1.08 COORDINATION

- A. A. Coordinate work under provisions of Section 013100 - PROJECT MANAGEMENT AND COORDINATION.
- B. Coordinate the work with door opening construction, door frame and door hardware installation.

1.09 WARRANTY

- A. Provide manufacturer's warranty under provisions of Section 017800 - CLOSEOUT SUBMITTALS to the following term:
 - 1. Interior Stile and Rail Doors: Lifetime
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction,.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Eggers Stile and Rail Collection
- B. Other acceptable manufacturers:
 - 1. Maiman Door
 - 2. Marshfield Door Systems
 - 3. Or approved equal.

2.02 DOOR CONSTRUCTION

- A. Face Veneer: WDMA A grade. Veneer species: White Maple or as required to match existing species. Veneer cut: Plain Sliced to match existing veneers.
 - 1. Veneer orientation on top, cross and bottom rails shall run between the vertical stiles, and mullions shall run between horizontal rails. Components shall be selected for compatibility of color, member-to-member. Veneer match between adjacent flitch leaves within a single panel shall be random running slip. Veneer sequence between adjacent panels shall be selected for compatibility of grain and color. Veneered panel sequence between paired doors shall be selected for compatibility in general appearance.

2.03 MATERIALS

- A. Stiles, Rails, Mullions and Cross rails: Shall be solid core construction using wood species to match existing doors. Joints to be tongue and grooved, doweled, and glued under pressure with Type I, waterproof glue.
- B. Panels: Solid core with perimeter shaped to proper contour, with panels to match existing doors. Panel edge concealed after assembly by solid lumber sticking bead. Panels edges shall be machined to produce have raised panel profile to match existing doors
- C. Sticking: Beveled profile to match existing door sticking, coped at corners, same species as face veneer. Overall Thickness: 1 3/4 inch
 - 1. Top Rail: as detailed.
 - 2. Lock Rail: as detailed.
 - 3. Stiles: as detailed.
 - 4. Bottom Rail: as detailed.
 - 5. Cross rails & Mullions: as detailed.
 - 6. Muntin Bars: as detailed.
- D. The outer most vertical edges of the lock or hinge stiles, on single doors: lumber of same specie as face veneer.
- E. Meeting vertical edge (lock edge) of stiles on fire rated pair doors: Fire treated Maple lumber, veneer banded to match face veneers.

2.04 ADHESIVES

- A. Facing Adhesive: Type I - waterproof.

2.05 FABRICATION

- A. Fabricate forty-five (45) minute fire-rated and non-rated doors in accordance with specified manufacturers' and Intertek Testing Services - Warnock Hersey requirements. Attach fire rating label to the door.
- B. Door Company shall have the ability to provide fire-rated meeting stiles on double doors in lieu of overlapping metal edge and astragals as noted below:.
- C. Astragals for fire-rated double doors can only be fabricated of steel materials and be of specific configurations; refer to referenced fire test assembly for material and type. Astragals are usually provided by a door manufacturer and are not usually provided under the door hardware listings. Marshfield Door Systems has the approval to use fire treated meeting stiles on paired doors in lieu of an overlapping metal edge and astragal. However; all manufacturers do not. Certain vertical rod panic devices may require special astragal shapes, installation and may violate label ratings.
- D. Astragals for 90 Minute Fire-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge at mid-door thickness, specifically for double doors.
 - 1. Provide ninety (90) minute paired openings with doors not requiring an overlapping metal edge or astragal; Veneer band meeting stile edges to match face species.
 - 2. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- E. Factory pre-fit doors for frame opening dimensions identified on shop drawings.

2.06 FINISH

- A. Factory finish doors in accordance with WDMA in accordance with WDMA IS 6A-11:
 - 1. Finish Doors: System TR-6, custom grade quality, as selected by the Architect.
 - 2. Factory finish doors in accordance with approved sample.

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. Any deficiencies must be corrected prior to door installation.
 - a. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Hardware: For installation, see Sections 087100 "Door Hardware" and Section 061000 - "Rough Carpentry"
 - 1. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- B. Install fire-rated doors according to NFPA 80.
- C. Install smoke- and draft-control doors according to NFPA 105.
- D. 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 (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
 - 3. Trim bottom rail only to extent permitted by labeling agency.
- E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
 - 1. Factory-Finished Doors: Do not trim factory finished doors for width.

3.03 ADJUSTING

- A. Operation: Correct any deficiency that prohibits the door from swinging or operating freely. Do not remove hinge screws after initial insertion. Shims used for alignment purposes must be inserted between hinge and frame. Do not insert shims between hinge and door.
- B. To prevent stile failure, insure that door closers are properly adjusted and do not limit the door opening swing. Limit door opening swing only with a properly located stop.
 - 1. 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 SECTION INCLUDES

- A. Vault Access Hatch and related items.
- B. Clearwell access door and related items.

1.02 RELATED SECTIONS

- A. Section 033000 - CAST-IN PLACE CONCRETE.

1.03 SUBMITTALS

- A. Submit under provisions of Section 013300 - SUBMITTALS.
- B. Indicate on shop drawings plan layout, construction details and required clearances.
- C. Shop Drawing of unit and all accessory installations.

1.04 WARRANTY

- A. Manufacturer's warranty: Materials shall be free of defects in material and workmanship for a period of Ten (10) years from the date of installation. Should a part fail to function in normal use within this period, the manufacturer shall furnish a new part at no charge.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. BILCO COMPANY, New Haven, CT.
- B. HALLIDAY PRODUCTS, Orlando, FL.
- C. U.S.F. Fabrication, Inc.
- D. Approved equal.

2.02 VAULT ACCESS HATCH

- A. Hatch with automatic hold-open and operating arm, as manufactured by the BILCO Company, New Haven, CT (203) 934-6363, or approved equal. Doors and accessories shall be factory fabricated. Size as shown on the drawings.
 - 1. Cover: Shall be ¼" aluminum diamond pattern plate[, reinforced for a minimum of 300 psf (live load) and H-20 wheel loading.
 - 2. Frame: Channel frame shall be ¼ inch extruded aluminum with bend down anchor tabs around the perimeter. A continuous EPDM gasket shall be mechanically attached to the aluminum frame to create a barrier around the entire perimeter of the cover and significantly reduce the amount of dirt and debris that may enter the channel frame.
 - 3. Doors shall open to 90° and lock automatically in that position. Provide stainless steel pins
 - 4. Hinges: Shall be specifically designed for horizontal installation and shall be through bolted to the cover with tamperproof Type 316 stainless steel lock bolts and shall be through bolted to the frame with Type 316 stainless steel bolts and locknuts.
 - 5. Drain Coupling: Provide a 1-1/2" (38mm) drain coupling located in right front corner of the channel frame.

6. Lifting mechanisms: Manufacturer shall provide the required number and size of compression spring operators for easy operation. Provide a vinyl grip handle to release the cover enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and to act as a check in retarding downward motion of the cover when closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe fastened to a formed 1/4" gusset support plate.
 7. A removable exterior turn/lift handle with a spring loaded ball detent shall be provided to open the cover and the latch release shall be protected by a flush, gasketed, removable screw plug.
 8. Hardware: Shall be anticorrosion throughout.
 - a. Hinges: Heavy forged aluminum hinges, each having a minimum 1/4" (6.3 mm) diameter Type 316 stainless steel pin, shall be provided and shall pivot so the cover does not protrude into the channel frame.
 - b. Cover shall be equipped with a hold open arm which automatically locks the cover in the open position.
 - c. Cover shall be fitted with the required number and size of compression spring operators. Springs shall have an electro-coated acrylic finish. Spring tubes shall be constructed of a reinforced nylon 6/6 based engineered composite material.
 - d. A Type 316 stainless steel snap lock with fixed handle shall be mounted on the underside of the cover.
 - e. Compression spring tubes shall be an anti-corrosive composite, all hardware and fasteners shall be Type 316 stainless steel material. Springs shall have an electro-coated acrylic finish for corrosion resistance
 9. Factory finish shall be mill finish aluminum with bituminous coating applied to the exterior of the frame.
- B. Fall Protection Grating:
1. Grating panel(s) shall be fiberglass, molded in one piece, with load bearing bars in both directions to allow for use without continuous side support.
 2. Panel shall be designed to support a 300 PSF live load and be high visibility safety yellow in color.
 3. Torsion rod lift assistance shall be provided for ease of operation and a hold open arm shall be included to automatically lock the panel in the fully open 90 degree position.
 4. A release handle shall be provided to close the grating panel and there shall be a provision to lock the panel to prevent unauthorized access.
 5. Hold open arm shall be aluminum with a stainless steel release handle.
 6. All other hardware, including mounting brackets, hinges, torsion rod, padlock loop, and fasteners, shall be type 316 stainless steel.
 7. Manufacturer shall provide a twenty-five year warranty against defects in material and workmanship.
- C. Ladder Safety Post
1. Post shall be high strength, type 304 stainless steel tubing, and mill finish, with a pull-up loop at its upper end.
 2. All hardware, including mounting brackets, hinges, torsion rod, padlock loop, and fasteners, shall be type 316 stainless steel.
 3. Up and down movement shall be controlled by a stainless steel balancing spring mechanism.
 4. Post shall lock automatically when extended, and a release lever must be activated to disengage the post to permit the return to the lowered position.

2.03 CLEARWELL ACCESS HATCH

- A. Access Hatch shall be prefabricated ready for installation and use.

- B. Door construction:
 - 1. Cover: Shall be 1/4" aluminum diamond pattern plate[, reinforced for a minimum of 625 psf (live load), and capable of holding up to 10 ft. head of water. Manufacturer to provide structural calculations stamped by a registered professional engineer.
 - 2. Frame: Shall be 3/8" thick aluminum angle. Angle shall include a horizontal leg and 9/16" diameter mounting holes for bolting to concrete top slab. Frame to include a U-shaped neoprene gasket riveted to the frame to minimize water intrusion.
 - 3. Locks: Shall be 316 stainless steel nut and bolt pressure locks, with exterior staple for padlock. Locks shall be spaced so as to provide an adequate seal to prevent the intrusion of water up to the rated depth.
 - 4. Hinges: Shall be aluminum lugs with 316 stainless steel pins.
- C. Accessories & Options:
 - 1. Hatch shall be provided with an anodized finish.
 - 2. Provide standard open vertical compression spring operators for ease of operation.
 - 3. Provide bituminous coating system, applied to frame surface in contact with concrete, as per manufacturer's instructions.
 - 4. Provide retro-fitted anodized aluminum Hatch Safety Grate as a fall-through prevention system, designed for live loads up to 300 psf. Grating shall not be colored (USF standard is OSHA safety orange). Hardware components of the safety grating shall be stainless steel. Submit grate opening size options to Engineer for review.
- D. Door Operation:
 - 1. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
 - 2. Operation of the cover shall not be affected by temperature.
 - 3. Cover and grating shall be operated separately and shall automatically lock in the full open position.
 - 4. The access door may not be closed without first closing the safety grate.
 - 5. The safety grating shall be operated and reinforced independently of the access hatch. If the grating is damaged or removed, the access door shall continue to operate at the specified load and deflection requirements.

2.04 FABRICATION

- A. Fabricate components free of visual distortions and defects. Weld corners and joints.
- B. Provide for removal of condensation occurring within components or assembly.
- C. Fit components for weather-tight assembly.
- D. Apply bituminous paint on surfaces of units to be in contact with cementitious materials or dissimilar metals.

2.05 QUALITY ASSURANCE

- A. Guarantee access doors against defects in material and workmanship for a period of ten (10) years.

PART 3 - EXECUTION

3.01 DELIVERY AND STORAGE

- A. Delivery of materials to the site shall be made in unopened cartons with the name of the manufacturer clearly visible on the carton.

- B. Materials shall be stored in a safe, dry place.

3.02 INSTALLATION

- A. Install access doors in accordance at location indicated on the drawings and according to manufacturer's instructions. Set flush in top slab and square and parallel to foundation/vault walls. Set plumb to top slab/floor.
- B. Install hatch in accordance with OSHA regulations.
- C. Installer shall supply and install mechanical fasteners compatible with the roof deck and the hatch.
- D. Manufacturer shall furnish fasteners necessary for ladder safety post installation.
- E. Install ladder safety post in accordance with the manufacturer's installation instructions.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide Sound Retardant Wood Swing Door Systems where shown on drawings and specified herein.
- B. Related Work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.02 QUALITY ASSURANCE

- A. Experience: Provide work of this Section designed and furnished by one manufacturer. Use a manufacturer who has been engaged in the manufacture of Sound Retardant Wood Swinging Door systems for at least five (5) years immediately prior to the start of this work, who has a history of successful production acceptable to the Architect and is certified for chain-of-custody by an FSC-accredited certification body when FSC wood is specified.

1.03 REFERENCES

- A. ASTM A366: Standard Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.
- B. ASTM A1011: Standard Specification for Steel, Hot-Rolled Sheet and Strip, Commercial.
- C. ASTM B117: Standard Method of Salt Spray (Fog) Testing
- D. ASTM D1735: Standard Practice for Testing Water Resistance of Coating Using Water Fog Apparatus.
- E. ASTM E90: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss in Building Partitions.
- F. ASTM E336: Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.
- G. ASTM E413: Classification for Determination of Sound Transmission Class
- H. UL10B: Fire Tests of Door Assemblies.
- I. UL10C: Positive Pressure Fire Tests of Door Assemblies.
- J. UBC7-2: Fire Tests of Door Assemblies.
- K. NFPA 80: Standard for Fire Doors and Fire Windows
- L. HMMA 840: Installation and Storage of Hollow Metal Doors and Frames.
- M. WDMA Industry Standard I.S. 1-A-11
- N. AWI 7th Edition, Version 1.0

1.04 SUBMITTALS

- A. Shop Drawings: Submit a schedule of items to be provided under this Section along with shop drawings in sufficient detail to show fabrication, installation, anchorage and interface of the work of this section with the work of adjacent trades.

- B. Acoustical Certification: Provide certification that the door construction utilized has been tested at an independent laboratory in accordance with ASTM E90, and that the STC rating determined in accordance with ASTM E413, is not less than that specified in Part 2 of this Section. The laboratory referenced in the certification must be qualified under the National Voluntary Accreditation Program (NVLAP) of the U.S. Bureau of Standards. Certification must reference laboratory name, test report number, and date of test; substitution of test data not in accordance with ASTM E90 and ASTM E413 will not be acceptable.
- C. Finish Samples: Provide one (1) 8" x 10" sample for each material and finish on the project.
- D. Secondary Requirements: Fire Resistance - as required, certify that assemblies have been tested in accordance with Standard for Safety UL 10b for neutral pressure requirements or Standard for Safety UL10C/UBC7-2 for positive pressure requirements of labeled fire doors and frames, and meet the applicable requirements of NFPA 80. When positive pressure fire ratings are required, Category B frame mounted intumescent shall be used.
- E. Installation Instructions: Provide recommended installation procedures which, upon approval by the architect, will become the basis for acceptance or rejection of the actual procedures used for installation.
- F. Warranty: Upon completion of the work of this Section, provide the Architect with two (2) copies of the manufacturer's standard written one (1) year warranty.

PART 2 -PRODUCTS

2.01 MANUFACTURER

- A. Design Basis and Type: Sound Retardant Wood Swing Door System designs are based on those manufactured by Overly Door Company, Greensburg, PA 15601. Tel 800-979-7300, Fax 724-830-2871.
- B. Or approved equal.

2.02 PERFORMANCE

- A. Performance: Sound Retardant Wood Swing Door System to be Overly Model No. 449718 or equal with STC rating of 44 when tested as an operable system in accordance with ASTM E90 and ASTM E413.

2.03 COMPONENTS

- A. Components: Assemblies to be complete with the following:
 - 1. Wood door(s)
 - 2. Sealing system.
 - 3. 5" Heavy-Duty Ball Bearing Hinges.
 - 4. Vision lights: Flat type metal loose stops for dual pane glazing. Glass and glazing shipped loose for field installation.
 - a. Available Glazing:
 - 1) 1/4 inch Acousta-Pane 36.
 - 2) 3/8 inch Acousta-Pane 38.
 - b. Dual glazing shall be configured using a 1/4 inch and 3/8 inch panes to produce a 1 3/4 inch panel with welded 4 sided metal stops.
 - c. Glazing Frames:
 - 1) Doors 1 3/4 inch thick: Zero No. 4484 Sound Trap Vision Lite

2.04 FABRICATION

- A. Existing metal frames shall be refurbished to accept required hardware and re-finished as noted on the Finish Schedule.
- B. Door Design: Sound Retardant Wood Swinging Doors shall be a 1-3/4" thickness construction with sizes as indicated on Architect approved shop drawings. No visible seams shall be permitted on door faces. Internal sound retardant core and perimeter door edge construction to be manufacturer's standard for the specified model. No lead or asbestos shall be permitted in door construction to achieve STC performance. Face veneer species cut and color to be as selected from manufacturer's full range of available colors and patterns. No lead or asbestos shall be permitted in door construction to achieve performance requirements.
- C. Glazing: Provide dual acoustical glazing in sizes and locations as indicated on the architectural drawings.
- D. Cam Lift Hinges: When required to achieve STC, manufacturer to furnish laboratory test data certifying hinges have been cycled a minimum of 1,000,000 while supporting a minimum door weight of 350 pounds.
- E. Hardware Reinforcements: Factory mortise, reinforce, drill and tap frames for all mortise hardware as required by hardware manufacturer's template. Factory mortise and reinforce doors for all mortise hardware. Provide necessary reinforcement plates as required for surface mounted hardware; all drilling and tapping to be done in field by installer. Provide dust cover boxes on all frame mortises.
- F. Frame Painting and Cleaning: After fabrication of frames, all tool marks and surface imperfections shall be removed and exposed faces of all welded joints dressed smooth. Chemically treat all surfaces to insure maximum paint adhesion and coat with a VOC compliant rust-inhibitive primer.
- G. Door Finishing: Factory finishing of Sound Retardant Wood Swinging Doors shall be done in accordance with AWI Quality Standards.
- H. Door Finish:
 - 1. Plastic Laminate Finish as selected by the Architect from the manufacturers full color and surface offering.
- I. Door Hardware:
 - 1. Door Perimeter seals: Double bubble seals .
 - 2. Mortised Door Bottom Seal: Zero No. 365 (STC 49)
 - 3. Double Door Astragal: Zero No. 383 for Wood Doors.
 - 4. Door Threshold: Zero No. 568A or Smooth sill as indicated on the drawings.
 - 5. Door Lever Lockset: Exit Device to match existing type and keying.

PART 3 - EXECUTION

3.01 SITE STORAGE AND PROTECTION OF MATERIALS

- A. Receipt: Upon receipt of product, all materials shall be thoroughly inspected and all discrepancies, deficiencies and/or damages shall be immediately reported to the supplier in writing

- B. Frame Storage: Store all frames on planks or dunnage in a dry location in a vertical position, spaced by blocking to permit air circulation between units. Cover all material or store in a controlled area to protect from damage.
- C. Door Storage: Do not deliver or install doors until spaces are enclosed, weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 degrees F and relative humidity between 25 and 55 percent during remainder of construction.
- D. INSTALLATION
 - 1. Prior to installation, secure the services of a qualified representative of the manufacturer to visit the job site and instruct the contractor's personnel in proper installation and adjustment of the assemblies or secure services of manufacturer's factory trained and authorized installer to perform installation of assemblies.
 - 2. Install work of this Section in strict accordance with approved shop drawings and manufacturer's recommended installation instructions. Field finishing of wood doors, when required, shall be done with manufacturer's recommended finishing guidelines for the particular face veneer species supplied.
 - 3. Upon installation, secure the services of a qualified representative of the manufacturer to visit the jobsite and inspect the complete installation of the door and frame assemblies, test all components thru a minimum of ten (10) cycles of operation and direct installer in correcting any non-conforming items found.
 - 4. Distortion: Upon installation, doors shall be allowed to acclimate through a full cycle of seasons, for a period not to exceed one (1) year, after which distortion shall be checked in accordance with NWWDA 1.S 1-A.
- E. FIELD TESTING
 - 1. Secure the services of a qualified Independent Testing agency to test door and frame installations selected by Owner/Architect in accordance with ASTM E336. Installed product shall perform no less than five (5) FSTC rating points below the specified STC rating. Any installations which fail to meet these criteria shall be examined, re-worked and re-tested until compliance is obtained.

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. Mechanical door hardware for the following:
 - a. Swinging doors.
 - b. Overhead and Sectional Doors.
 - c. Counter Shutters.
 - 2. Electromechanical and access control door hardware.
 - a. Electromechanical and access control door hardware power supplies, back-ups and surge protection.
 - 3. Cylinders for door hardware specified in other Sections.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Other Action Submittals:
 - 1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - a. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 - b. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.
 - c. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - d. Content: Include the following information:
 - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
 - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - 4) Fastenings and other pertinent information.
 - 5) Explanation of abbreviations, symbols, and codes contained in schedule.
 - 6) Mounting locations for door hardware.
- C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- C. Warranty: Special warranty specified in this Section.
- D. CLOSEOUT SUBMITTALS
 - 1. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.
- E. QUALITY ASSURANCE
 - 1. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
 - a. Warehousing Facilities: In Project's vicinity.
 - b. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 - c. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
 - 2. Architectural Hardware Consultant Qualifications: A 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 who is currently certified by DHI as follows:
 - a. For door hardware, an Architectural Hardware Consultant (AHC) who is also an Electrified Hardware Consultant (EHC).
 - 3. Source Limitations: Obtain each type of door hardware from a single manufacturer.
 - 4. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies 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, unless otherwise indicated.
 - 5. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - a. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.
 - 6. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
 - 7. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines ICC A117.1.
 - a. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
 - b. Comply with the following maximum opening-force requirements:
 - 1) Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
 - 2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - c. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
 - d. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

F. DELIVERY, STORAGE, AND HANDLING

1. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
2. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
3. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

G. COORDINATION

1. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
2. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
3. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

H. WARRANTY

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures including excessive deflection, cracking, or breakage.
 - 2) Faulty operation of doors and door hardware.
 - 3) Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - b. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
 - 1) Manual Closers: 10 years from date of Substantial Completion.
 - 2) Seven years for heavy duty cylindrical (bored) locks and latches.
 - 3) Five years for exit hardware.
 - 4) Twenty five years for manual overhead door closer bodies.
 - 5) Five years for motorized electric latch retraction exit devices.
 - 6) Two years for electromechanical door hardware.

I. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

J. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware

(including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 3. Review sequence of operation narratives for each unique access controlled opening.
 4. Review and finalize construction schedule and verify availability of materials.
 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- K. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

PART 2 - PRODUCTS

2.01 DOOR HARDWARE

- A. Provide door hardware for each door as scheduled on Drawings to comply with requirements in this Section.
1. Door Hardware Sets: Provide quantity, item, size, finish or color required for each new door leaf. Provide function as required by location.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.
 2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

2.02 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Hager Companies.
 - b. IVES Hardware; an Ingersoll-Rand company.
 - c. McKinney Products Company; an ASSA ABLOY Group company.
 - d. Stanley Commercial Hardware; Div. of The Stanley Works.
 2. Quantity: Provide the following hinge quantity, unless otherwise indicated:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 3. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'-0": 4-1/2 inch standard.
 - b. Sizes from 3'-1" to 4'-0": 5 inch heavy weight.
 4. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

5. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:
 - a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

2.03 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 1. Bored Locks: Minimum 1/2-inch latchbolt throw.
 2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
 3. Deadbolts: Minimum 1.25-inch bolt throw.
- C. Lock Backset: 2-3/4 inches (70 mm), unless otherwise indicated.
- D. Lock Trim:
 1. Levers: Cast (Mortise Type) and Wrought (Cylindrical Type).
 2. Escutcheons (Roses): Cast (Mortise Type) and Wrought (Cylindrical Type).
 3. Dummy Trim: Match lever lock trim and escutcheons.
 4. Operating Device: Lever with escutcheons (roses).
- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
 1. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

2.04 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 2. Strikes for Bored Locks and Latches: BHMA A156.2.
 3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
 4. Dustproof Strikes: BHMA A156.16.

2.05 POWER TRANSFER DEVICES

- A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
 1. Acceptable Manufacturers:

- a. Hager Companies (HA) - ETW-QC (# wires) Option.
 - b. McKinney Products (MK) - QC (# wires) Option.
- B. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
- 1. Acceptable Manufacturers:
 - a. Adams Rite (AD) - 4612 Series.
 - b. Securitron (SU) - EL-EPT Series.
- C. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.
- 1. Provide one each of the following tools as part of the base bid contract:
 - a. McKinney Products (MK) - Electrical Connecting Kit: QC-R001.
 - b. McKinney Products (MK) - Connector Hand Tool: QC-R003.
 - 2. Acceptable Manufacturers:
 - a. McKinney Products (MK) - QC-C Series.

2.06 AUXILIARY LOCKS

- A. Bored Auxiliary Locks: BHMA A156.5: Grade 1; with strike that suits frame.
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Arrow USA; an ASSA ABLOY Group company.
 - b. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.07 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
- 1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL 305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 - 2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 - a. Fire Exit Removable Mullions: Provide keyed removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions to be used only with exit devices for which they have been tested.
 - 3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is not acceptable except in any case where the door light extends behind the device as in a full glass configuration.
 5. Flush End Caps: Provide heavy weight impact resistant flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
 6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty trim with cold forged escutcheons, beveled edges, and four threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets. Provided free-wheeling type trim where indicated.
 - b. Where function of exit device requires a cylinder, provide an interchangeable core type keyed cylinder (Rim or Mortise) as specified in Hardware Sets.
 7. Vertical Rod Exit Devices: Provide and install interior surface and concealed vertical rod exit devices as Less Bottom Rod (LBR) unless otherwise indicated.
 8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2 inch wide stiles.
 9. Dummy Push Bar: Non-functioning push bar matching functional push bar.
 10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices, Aluminum Entrances: BHMA A156.3, Grade 1 certified panic devices furnished in the functions specified in the Hardware Sets. Push bar to be made of extruded aluminum, maximum projection of 3 inches, available in clad or anodized architectural finishes. Exit device design to fit narrow (minimum 2 inch), medium, or wide stile aluminum door applications.
1. Acceptable Manufacturers:
 - a. Adams Rite Manufacturing (AD) - 8000 Series.
 - b. Falcon Hardware (FA) - Dor-O-Matic 1490/1590 Series.

2.08 SURFACE BOLTS

- A. Surface Bolts: BHMA A156.16.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on the drawings or comparable product by one of the following:
 - a. IVES Hardware; an Allegion company.
 - b. Rockwood Mfg.; an ASSA ABLOY Company

2.09 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Best Access Systems; Div. of Stanley Security Solutions, Inc.
 - b. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - c. Corbin Russwin Manufacturing Company; an ASSA ABLOY Group company.

2.10 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
1. Existing System:
 - a. Master key or grand master key locks to Owner's existing system.
- B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."

2.11 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; stainless steel, unless otherwise indicated.

2.12 ELECTRIC STRIKES

- A. Standard Electric Strikes: Heavy duty, cylindrical and mortise lock electric strikes conforming to BHMA A156.31, Grade 1, UL listed for both Burglary Resistance and for use on fire rated door assemblies. Stainless steel construction with dual interlocking plunger design tested to exceed 3000 lbs. of static strength and 350 ft-lbs. of dynamic strength. Strikes tested for a minimum 1 million operating cycles. Provide strikes with 12 or 24 VDC capability and supplied standard as fail-secure unless otherwise specified. Option available for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike.
 1. Acceptable Manufacturers:
 - a. Folger Adam EDC (FO).
 - b. HES (HS).

2.13 SURFACE CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
 2. Standards: Closers to comply with UL 10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
 4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ICC A117.1.
 5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt and security type fasteners as required for proper installation.
- B. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Corbin Russwin Hardware (RU) - DC6000 Series
 - b. DORMA Architectural Hardware; Member of The DORMA Group North America.
 - c. LCN Closers (LC); an Allegion Company - 4040 Series.
 - d. Norton Door Controls (NO); an ASSA ABLOY Group company - 7500 Series.
 - e. Yale Locks and Hardware (YA) - 4400 Series.

2.14 MAGNETIC HOLD OPENS

- A. Magnetic Hold Opens: Heavy duty electrically controlled door holding magnets, surface mounted wall die cast housing with concealed wiring.
 - 1. Basis of Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product.
 - a. LCN, an Allegion Company: SEM 7800 Series
 - b. Or Approved Equal
- B. Standards: Comply with the following:
 - 1. UL listed for smoke barrier or labeled fire doors
 - 2. ANSI Standard A156.15
- C. Provide manufacturer's standard for all magnets, armatures, cover and box of die cast material. Coordinate on site door locations and wall distances for extension and coupler assemblies requirements. Provide metal extensions as required.

2.15 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. IVES Hardware; an Allegion company.
 - b. Rockwood Mfg.; an ASSA ABLOY Company
- B. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 - 1. Acceptable Manufacturers:
 - a. Rixson Door Controls (RF).
 - b. Rockwood Manufacturing (RO).
 - c. Sargent Manufacturing (SA).

2.16 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are 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.
 - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies 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 according to UL 10C.
 - 1. Provide intumescent seals as indicated to meet UL 10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Acceptable Manufacturers:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. National Guard Products.
 - b. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
 - c. Zero International.

2.17 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. National Guard Products.
 - b. Pemko Manufacturing Co.; an ASSA ABLOY Group company
 - c. Zero International.

2.18 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Fire-Rated Applications:
 - a. Wood or Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
 - 2) Strike plates to frames.
 - 3) Closers to doors and frames.
 - b. Steel Through Bolts: For the following unless door blocking is provided:
 - 1) Surface hinges to doors.
 - 2) Closers to doors and frames.
 - 3) Surface-mounted exit devices.
 - 3. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.19 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- 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.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.03 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 1. Standard Steel Doors and Frames: ANSI/SDI A250.8
 2. Custom Steel Doors and Frames: NAAMM HMMA 831.
 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.
 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30

inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

- D. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant.
- E. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- F. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.04 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.05 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.06 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.07 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the Owner and Architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should 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 and functionality.
- B. Refer to Section 080671 - DOOR HARDWARE SCHEDULE, for hardware sets.
- C. The supplier is responsible for handling and sizing all products as listed in the door hardware sets. Quantities listed are for each pair of doors, or for each single door.
- D. Manufacturer's Abbreviations:
 - 1. MK - McKinney
 - 2. PE - Pemko
 - 3. RO - Rockwood
 - 4. SA - Sargent
 - 5. RX - Rixson
 - 6. NO - Norton
 - 7. SU - Securitron
 - 8. OT - Other
 - 9. HAG - Hager

- 10. VD - Von Duprin
- 11. BES - Best
- 12. LCN - LCN
- 13. SCH - Schlage
- 14. GLY - Glynn Johnson

HARDWARE SCHEDULE**HARDWARE SET 1.0**

DESCRIPTION: AUDITORIUM - EGRESS PAIR

2 Continuous Hinge	780-112HD UL	US32D	HAG
2 Exit Device (SVR, LBR, passage)	9827I-BE-F-LBRvon duprin	US32D	VD
2 Surface Closer	4111 EDA	689	LCN
2 Kick Plate	K1050 8" 4BE CSK	US32D	RO
2 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
2 Door Holder	Multi position, Built into door closer		
1 Head & Jamb Seal (adhesive)	S442BL		PE
1 Astragal (adhesive, edge mount)	S771C		PE

HARDWARE SET 2.0

DESCRIPTION: STAIR 'C' PAIR

2 Continuous Hinge	780-112HD UL	US32D	HAG
2 Exit Device (SVR, LBR, passage)	9827I-BE-F-LBRvon duprin	US32D	VD
2 Surface Closer	4111 EDA	689	LCN
2 Kick Plate	K1050 8" 4BE CSK	US32D	RO
2 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
2 Electromagnetic Holder	998M (or to suit conditions)	689	RF
1 Head & Jamb Seal (adhesive)	S442BL		PE
1 Astragal (adhesive, edge mount)	S771C		PE

HARDWARE SET 3.0

DESCRIPTION: AUDITORIUM UNDER STAGE PAIR

4 4 1/2" Hinge	TA2714	US26D	MK
1 Lever Extension Flush Bolt	557	US26D	RO
1 Cabinet Door Lock	CL888R	626	SCH

HARDWARE SET 4.0

DESCRIPTION: ATTIC ACCESS

1 Continuous Hinge	780-112HD UL	US32D	HAG
1 Storeroom/Closet Lock	45H 7D 15H	US26D	BES
2 Surface Closer	4111 EDA	689	LCN

SECTION 087100 - DOOR HARDWARE

H2M

1 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1 Head & Jamb Seal (adhesive)	S442L		PE

HARDWARE SET 5.0

DESCRIPTION: BATHROOM - PRIVACY

1 Continuous Hinge	780-112HD UL	US32D	HAG
1 Privacy Lock	45H L 15H VIN	US26D	BES
1 Surface Closer	4011/4111 EDA	689	LCN
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Mop Plate	K1050 4" 4BE CSK	US32D	RO
1 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3 Silencers	608		RO
1 Coat Hook	806	US 26D	RO

HARDWARE SET 6.0

DESCRIPTION: POCKET DOOR

1 Concealed Pocket Frame Kit	PF28200A-PF134 w/ Soft Close		PE
2 Bottom Door Guide	102N	US26D	PE
1 Flush Cup Pull	503SF		PE
1 Split Key and Edge Pull	1422	US26D	RO

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 Sidelite 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. 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 of the following products; 12 inches (300 mm) square.
 - 1. Fire-resistive glazing products.
- 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. 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.
- B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- D. 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.
- E. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
- F. 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."
- G. 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.
- H. 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 (250 deg C), and the fire-resistance rating in minutes.

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.

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: 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: 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. 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 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172, 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.
- B. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

2.03 FIRE-PROTECTION-RATED 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. Laminated Fire-Rated (20 to 180 minutes), High Impact Safety-Rated Ceramic Glass, Ultra-HD technology, 5/16 inch thickness meeting CPSC 16CFR1201 (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. or approved equal

2.04 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 C 509, 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.

2.05 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 C 920, 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.

2.06 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 C 1281 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.

2.07 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.

2.08 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.

2.09 GLASS TYPES

- A. Laminated safety glass.
 - 1. Thickness: 5/16" (1/8" layers with 0.030 clear PVB interlayer)
 - 2. Tint: Clear.
 - 3. Type Laminated.
 - 4. Use: Interior non-fire-rated door lites.
- B. Fire-rated glazing:
 - 1. Thickness: 5/16"
 - 2. Tint: Clear.
 - 3. Type: Ceramic fire-rated.
 - 4. Use: Interior Fire-rated door lites.
- C. Hazardous Glazing Locations:
 - 1. Door Glazing.
 - 2. Window Glazing within 24" of doors and within 60" A.F.F. (above finish floor).
 - 3. Window glazing adjacent to stairs, ramps and landings (within 60" A.F.F.)
 - 4. Window glazing that meets all of the following: greater than 9 sq. ft. in area, bottom edge of glazing within 18" A.F.F., top edge 36" A.F.F.
 - 5. Where indicated as safety glazing on the construction drawings.

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 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. Non-load-bearing steel framing systems for interior gypsum board assemblies.
 - 2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.04 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For firestop tracks, from ICC-ES.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, 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.

2.02 FRAMING SYSTEMS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. 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. See "Corrosion Protection of Steel Framing" Article in the Evaluations for a discussion of corrosion-resistant coatings on components.
 - 3. Protective Coating: ASTM A653/A653M, G60 (Z180), hot-dip galvanized unless otherwise indicated.
- C. Studs and Runners: ASTM C645. Use either steel studs and runners or dimpled steel studs and runners.
 - 1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 20 gauge (0.033 inch).
 - b. Depth: 4 inches, 3-5/8 inches, 2-1/2 inches, 1-5/8 inches as indicated on the drawings.
 - 2. Dimpled Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 22 gauge (0.027 inch).

- D. Firestop 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 not less than indicated for studs and in width to accommodate depth of studs.
- E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base-Metal Thickness: As indicated on Drawings or a minimum of 0.033 inch.
- F. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal 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.
- G. Hat-Shaped, Rigid Furring Channels: ASTM C645.
 - 1. Minimum Base-Metal Thickness: 20 gauge (0.033 inch).
 - 2. Depth: 7/8 inch, 1-1/2 inches as indicated on the drawings.
- H. Resilient Furring Channels: 1/2-inch deep, steel sheet members designed to reduce sound transmission.
 - 1. Configuration: Asymmetrical.
- I. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 16 gauge (0.057 inch) gauge, and depth required to fit insulation thickness indicated.
- J. Column Flange Grip Clips: Pre-manufactured Column/Beam connectors for rapid installation of board type materials to Steel Column and Beam Flanges. ASTM A1003/A1003M Structural Grade 33 (230) Type H, ST33H (ST230H): 33ksi (230MPa) minimum yield strength, 45ksi (310MPa) minimum tensile strength, 27mil minimum thickness (22 gauge, 0.0283" design thickness) with ASTM A653/A653M G60 (Z180) hot dipped galvanized coating. Manufacturer: The steel Network, Inc. Unit connection box measures 1 inch deep, 2 inches wide and 2 1/2 inches long with a spring clip depth of 2.375 inches and a curved clip spring clearance of .2 inches.
 - 1. Install as indicated on the drawings. Maximum spacing 24" on center.

2.03 SUSPENSION SYSTEMS

- A. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- B. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch wide flanges.
 - 1. Depth: As indicated on Drawings.
- D. Furring Channels (Furring Members):
 - 1. Cold-Rolled Channels: 16 gauge (0.057 inch) uncoated-steel thickness, with minimum 1/2-inch wide flanges, 3/4 inch deep.
 - 2. Dimpled Steel Studs and Runners: ASTM C645.
 - a. Minimum Base-Metal Thickness: As indicated on Drawings or 20 gauge (0.033 inch).
 - b. Depth: As indicated on Drawings.
 - 3. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch deep.

2.04 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Metal Framing: Type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
 - 1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), non-perforated.
 - 2. Foam Gasket: 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.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. 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.
 - 1. Gypsum Board Assemblies: 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, and 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 FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
 - 2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
 - 3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (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 door frames; 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. 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.
 - 4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
 - 5. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.
 - c. Products such as Curv-Trak and Flex-C Trac may be submitted for approval to accomplish radius wall applications.
- E. Direct Furring:
 - 1. Screw to wood framing where applicable.
 - 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Z-Furring Members:
 - 1. Erect insulation, specified in Section 072100 - THERMAL 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.

- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.05 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types as indicated.
 - 1. Hangers: 48 inches o.c.
 - 2. Carrying Channels (Main Runners): 48 inches o.c.
 - 3. Furring Channels (Furring Members): 16 inches o.c.
- 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.

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. Gypsum plastering on expanded-metal lath.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

1.04 QUALITY ASSURANCE

- A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockups for each substrate and finish texture indicated for gypsum plastering, including accessories.
 - a. Size: 100 sq. ft. (9 sq. m) in surface area.
 - 2. Simulate finished lighting conditions for review of mockups.
 - 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.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, contamination, corrosion, construction traffic, and other causes.

1.06 FIELD CONDITIONS

- A. Comply with ASTM C842 requirements or gypsum plaster manufacturer's written recommendations, whichever are more stringent.
- B. Room Temperatures: Maintain temperatures at not less than 55 degrees F (13 degrees C) or greater than 80 degrees F (27 degrees C) for at least seven days before application of gypsum plaster, continuously during application, and for seven days after plaster has set or until plaster has dried.
- C. Avoid conditions that result in gypsum plaster drying out too quickly.
 - 1. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
 - 2. Maintain relative humidity levels for prevailing ambient temperature that produce normal drying conditions.
 - 3. Ventilate building spaces in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

PART 2 - PRODUCTS

2.01 EXPANDED-METAL LATH

- A. Expanded-Metal Lath: ASTM C847, cold-rolled carbon-steel sheet with ASTM A653/A653M, G60 (Z180), hot-dip galvanized-zinc coating.
 - 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:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. ClarkDietrich Building Systems.
 - b. MarinoWARE.
 - 3. Flat-Rib Lath: Rib depth of not more than 1/8 inch (3 mm), 3.4 lb/sq. yd. (1.8 kg/sq. m).

2.02 ACCESSORIES

- A. General: Comply with ASTM C841, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- B. Metal Accessories:
 - 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. ClarkDietrich Building Systems.
 - b. MarinoWARE.
 - 2. Cornerite: Fabricated from expanded-metal lath with ASTM A653/A653M, G60 (Z180), hot-dip galvanized-zinc coating.
 - 3. Cornerbeads: Fabricated from zinc or zinc-coated (galvanized) steel.
 - 4. Casing Beads: Fabricated from zinc; square-edged style; with expanded flanges.
 - 5. Control Joints: Fabricated from zinc; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 - 6. Two-Piece Expansion Joints: Fabricated from zinc; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch (6 to 16 mm) wide; with perforated flanges.
- C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated on Drawings.
 - 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. Fry Reglet Corporation.
 - b. Gordon, Inc.
 - c. MM Systems Corporation.
 - d. Pittcon Industries.
 - 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221, Alloy 6063-T5.
 - 3. Finish: Insert requirements for anodic or other factory-applied coatings.

2.03 MISCELLANEOUS MATERIALS

- A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Bonding Compound: ASTM C631.

- C. Fasteners for Attaching Metal Lath to Substrates: ASTM C841.
- D. Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch (1.21-mm) diameter unless otherwise indicated.
- E. Mix Additives: Use gypsum plaster accelerators and retarders from plaster manufacturer if required by Project conditions. Use only additives that manufacturer recommends in writing for use with plaster to which it is added.

2.04 BASE-COAT PLASTER MATERIALS

- A. Recycled Content of Gypsum Plaster: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 10 percent.
- B. High-Strength Gypsum Neat Plaster: ASTM C28/C28M, with a minimum, average, dry compressive strength of 2800 psi (19 MPa) according to ASTM C472 for a mix of 100 lb (45 kg) of plaster and 2 cu. ft. (0.06 cu. m) of sand.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. USG Corporation; Structo-Base.
- C. Aggregates for Base-Coat Plasters: ASTM C35, sand.

2.05 FINISH-COAT PLASTER MATERIALS

- A. Gypsum Ready-Mixed Finish Plaster: Manufacturer's standard, mill-mixed, gaged, interior finish.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. USG Corporation; Imperial Veneer Finish Plaster.
 - b. Or approved equal.

2.06 PLASTER MIXES

- A. Mixing: Comply with ASTM C842 and manufacturer's written instructions for applications indicated.
- B. Mix Additives: Use accelerators and retarders, if required by Project conditions, according to manufacturer's written instructions.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

3.03 INSTALLATION, GENERAL

- A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

- B. STC-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
- C. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

3.04 INSTALLING EXPANDED-METAL LATH

- A. Expanded-Metal Lath: Install according to ASTM C841.

3.05 INSTALLING ACCESSORIES

- A. General: Install according to ASTM C841.
- B. Cornerbeads: Install at external corners.
- C. Casing Beads: Install at terminations of plasterwork, except where plaster passes behind and is concealed by other work and where metal screeds, bases, or frames act as casing beads.
- D. Control Joints: Locate as approved by Architect for visual effect, with spacing between joints in either direction not exceeding the following:
 - 1. Partitions: 30 feet (9 m).
 - 2. Ceilings: 30 feet (9 m).
- E. Aluminum Trim: Install according to manufacturer's written instructions.

3.06 PLASTER APPLICATION

- A. General: Comply with ASTM C842.
 - 1. Do not deviate more than plus or minus 1/8 inch in 10 feet (3 mm in 3 m) from a true plane in finished plaster surfaces when measured by a 10 foot (3 m) straightedge placed on surface.
 - 2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
 - 3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
- B. Bonding Compound: Apply on substrates for direct application of plaster.
- C. Base-Coat Plaster:
 - 1. Over Expanded-Metal Lath:
 - a. Scratch Coat: High-strength gypsum neat plaster with job-mixed sand.
 - b. Brown Coat: High-strength gypsum neat plaster with job-mixed sand.
 - 2. Over Unit Masonry: Gypsum neat plaster with job-mixed sand.
 - 3. Over Monolithic Concrete: Gypsum neat plaster with job-mixed sand.
- D. Finish Coats:
 - 1. Smooth-Troweled Finishes:
 - a. Materials: High-strength gypsum gaging plaster and lime putty.
 - b. Locations: Provide smooth-troweled finish unless otherwise indicated.
- E. Concealed Plaster:
 - 1. Where plaster application is concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.

2. Where plaster application is concealed above suspended ceilings and in similar locations, omit finish coat.
3. Where plaster application is used as a base for adhesive application of tile and similar finishes, omit finish coat.

3.07 PLASTER REPAIRS

- A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.08 CLEANING AND PROTECTION

- A. Remove temporary protection and enclosure of other work after plastering is complete. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Description of Work: Work of this section includes, but is not limited to, the following:
 - 1. Metal suspension systems
 - 2. Sound-rated construction and accessories

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications and installation instructions with project conditions and materials clearly identified or detailed for each required system.

1.03 SYSTEM REQUIREMENTS

- A. Performance Requirements: Fabricate and install systems as indicated but not less than that required to comply with ASTM C754 under the following conditions:
 - 1. Gypsum board partitions:
 - a. Standard systems: Maximum deflection of L/240 of partition height.
 - b. Systems to receive water resistant gypsum board or backer board: Maximum deflection of L/360 of partition height.
 - 2. Cavity shaftwall systems: Withstand minimum positive and negative pressure of 5 psf.
 - 3. Interior suspended ceilings and soffits: Maximum deflection of l/360 of distance between supports.
 - 4. Exterior soffits: Withstand minimum positive and negative pressure of 20 psf with maximum deflection of l/360 of distance between supports.
- B. Fire Resistance Ratings: Where fire resistance classifications are indicated, provide materials and application procedures identical to those listed by UL or tested according to ASTM E119 for type of construction shown.
- C. Acoustical Ratings: Where sound ratings are indicated, provide materials and application procedures identical to those tested by manufacturer to achieve Sound Transmission Class (STC) scheduled or indicated in accordance with ASTM E90.

1.04 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. Applicable requirements of ASTM C754 for installation of steel framing.
 - 2. Install gypsum board in accordance with applicable requirements and recommendations of Gypsum Association GA 216, "Recommended Specifications for the Application and Finishing of Gypsum Board" except for more stringent requirements of manufacturer.
 - 3. Apply acoustical sealant in accordance with applicable requirements of ASTM C919.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
 - 1. Deliver material to site promptly without undue exposure to weather.
 - 2. Deliver in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade.
- B. Storage:
 - 1. Store above ground in dry, ventilated space.
 - 2. Protect materials from soiling, rusting and damage.
 - 3. Store board to be directly applied to masonry walls at 70°F for 24 hours prior to installation.

1.06 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Do not install gypsum board when ambient temperature is below 40°F.
 - 2. For adhesive attachment of gypsum board, and for finishing of gypsum board, maintain ambient temperature above 55°F from one week prior to attachment or joint treatment, and until joint treatment is complete and dry.

1.07 ALTERNATE CONSTRUCTION WASTE DISPOSAL

- A. Reuse:
 - 1. Separate clean waste drywall pieces from contaminants for landfilling or recycling. Do not include vinyl-faced, mold-resistant or asphalt impregnated gypsum boards. Pulverize and apply to site soil in accordance to landscape specifications. Protect scrapes and pulverized material from moisture and contamination. Alternate to on-site soil amendment, work to supply local farming granular material for their use.
- B. Recycle:
 - 1. Separate clean waste drywall pieces from contaminants for landfilling or reuse. Working with local waste hauler and local drywall manufacturer, provide proper storage of waste for pickup and return. Protect scrapes material from moisture and contamination.

PART 2 - PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS

- A. Gypsum Board and Accessories: Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL.
- B. Steel Framing and Furring: Company acceptable to installer.
- C. Grid Suspension Assemblies: Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL.

2.02 BOARD MATERIALS

- A. Gypsum Board: See Section 092900 - GYPSUM BOARD.

2.03 METAL FRAMING AND FURRING MATERIALS

- A. Metal Studs and Runners:
 - 1. ASTM C645, "C" shaped, gauge:
 - a. Provide 25 gauge studs, except as otherwise indicated or specified. Provide heavier gauge as required / indicated on the drawings.
 - b. At door and borrowed light frames, provide (2) 25 gage minimum studs at each jamb. Where wall is indicated or specified to be typically framed with 20 gauge studs, provide (2) 20 gauge studs at each jamb.
 - c. Provide 20 gauge studs at walls to receive cement backer board with ceramic tile facing.
 - d. Provide runner gauge as recommended by stud manufacturer.
 - e. Depth of sections: As indicated.
 - f. Corrosion protection: G40 hot-dipped galvanized coating per ASTM A525.
- B. Shaft Wall Supports:

1. Conform to ASTM A446, Grade A, with G40 hot-dipped galvanized coating per ASTM A525.
 2. Studs:
 - a. Shape: "CH", "J" or "E" or as standard with manufacturer.
 - b. Gauge: As required to fulfill performance criteria, minimum 25 gauge. Provide 20 gauge for jamb and lintel components.
 - c. Size: As indicated.
 - d. J runners: 24 gauge, size as required for coordination with studs.
 - e. Jamb struts: 20 gauge with 3 inch back leg for use at elevator frames.
- C. Metal Furring Channels:
1. Hat-shaped:
 - a. ASTM C645, 7/8 inch high, 25 gauge, with G40 hot-dipped galvanized coating per ASTM A525.
 - b. Provide 20 gauge at furring to receive tile backer board.
 - c. Acceptable products: DWC-25 for ½" and 5/8" gypsum board and DWC-20 by USG.
 2. Z-shaped: ASTM C645, depths as indicated, 24 gauge minimum, with G40 hot-dipped galvanized coating per ASTM A525.
 3. Resilient: Manufacturer's standard type designed to reduce sound transmission; ½ inch deep, 25 gauge steel with G40 hot-dipped galvanized coating per ASTM A525.

2.04 CEILING AND SOFFIT SUPPORT MATERIALS

- A. Hanger Anchorage Devices: Screws, clips, bolts or other devices compatible with indicated structural anchorage for ceiling hangers and whose suitability has been proven through standard construction practices or by certified test data.
- B. Powder-Actuated Fasteners in Concrete: Fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers and with capability to sustain, without failure, a load equal to 10x calculated loads.
- C. Post-tensioned Concrete Slabs:
1. For inserts placed in post-tensioned concrete work, maintain 3 inch clearance between inserts and prestressing strands.
 2. If insert is in conflict with strand, insert must be moved to avoid strand. Do not move strands to avoid inserts.
- D. Hangers:
1. Steel wire or rods, sizes to comply with requirements of ASTM C754 for ceiling or soffit area and loads to be supported.
 2. Wire: ASTM A641/A641M, soft, Class 1 galvanized.
 3. Rods and flats:
 - a. Mild steel components.
 - b. Finish: Galvanized or painted with rust-inhibitive paint for interior work; galvanized for exterior work.
- E. Framing System:
1. Main runners:
 - a. Cold-rolled, "C" shaped steel channels, 16 gauge minimum.
 - b. Finish: Galvanized with G40 hot-dip galvanized coating per ASTM A525 for exterior work; galvanized or painted with rust-inhibitive paint for other interior work.
 - c. Form to required radius at curved ceilings.
 2. Cross furring: Hat-shaped steel furring channels, ASTM C645, 7/8 inch high, 25 gauge, galvanized.

3. Furring anchorages: 16 gauge galvanized wire ties, manufacturer's standard wire-type clips, bolts, nails or screws recommended by furring manufacturer and complying with ASTM C754.
 4. Provide compression posts and other accessories as required to comply with seismic requirements.
- F. Proprietary Framing System:
1. Framing system for gypsum board panels consisting of cold-rolled steel members conforming to ASTM C635/C635M, with exposed surfaces finished in manufacturer's standard enamel paint finish.
 2. Fire rating: 1 and 2 hour rating in accordance with UL assembly indicated.
 3. Components: Main tees, furring cross channels, furring cross tees, and cross tees.
 4. Accessories:
 - a. U-shaped channel molding.
 - b. Galvanized carbon steel (12 ga.) hanger wire.
 - c. Acceptable product: Equivalent to Drywall Suspension System by USG.

2.05 ACCESSORIES

- A. Metal Trim for Gypsum Board: See Section 092900 - GYPSUM BOARD.
1. Conform to profile and dimensions indicated.
 2. Material for interior work: Galvanized steel, 26 gauge minimum.
 3. Corner beads
 4. Casing beads (edge beads):
 5. Control joints:
 - a. Roll-formed zinc with perforated flanges.
 - b. Size: 1-3/4 inch wide, with 1/4 inch wide center channel.
 - c. Provide with removable tape strip over channel.
- B. Paper-Faced Metal Trim for Gypsum Board:
1. Conform to profile and dimensions indicated.
 2. Material for interior work: Comply with ASTM C1047.
- C. Trim for Exterior Soffits: Rolled zinc complying with ASTM C1047.
- D. Special Trim and Reveals: Extruded aluminum alloy 6063-T5, profiles as indicated.
- E. Molding and Trim for Vinyl-Faced Panels:
1. Manufacturer's standard rigid plastic molding.
 2. Include inside corners, end caps, battens and ceiling drive-in trim, as indicated.
- F. Backer Plates:
1. Steel, galvanized; 6 inches wide x 16 gauge minimum x lengths to suit size of items to be attached; fastened to studs for attachment of surface mounted fittings and accessories.
 2. Elimination of backer plates or direct attachment of accessories or equipment to studs will not be allowed.
- G. Hanger Wire Sound Isolators: Provide where indicated for sound-rated suspended ceilings.
- H. Adhesives and Joint Treatment Materials:
1. Conform to requirements of ASTM C475/C475M.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and adjoining construction and conditions under which work is to be installed. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Install in accordance with reference standards and manufacturer's instructions [and as required to comply with seismic requirements].
- B. Tolerances:
 - 1. Do not exceed 1/8 inch in 8'-0" variation from plumb or level in exposed lines of surface, except at joints between gypsum board units.
 - 2. Do not exceed 1/16 inch variation between planes of abutting edges or ends.
 - 3. Shim as required to comply with specified tolerances.
- C. Install framing to comply with ASTM C754 and with ASTM C840 requirements that apply to framing installation.
- D. Install supplementary framing, blocking and bracing at terminations in gypsum board assemblies to support fixtures, equipment, heavy trim, grab bars, toilet accessories, furnishings or similar construction.

3.03 METAL SUPPORT INSTALLATION

- A. Metal Runners:
 - 1. Align and secure runner tracks accurately to partition layout at both floor and ceiling.
 - 2. Provide fasteners appropriate to substrate construction as recommended by manufacturer.
- B. Metal Studs:
 - 1. Position metal studs vertically in the runners, spaced as indicated.
 - 2. Place studs so that flanges face in same direction.
 - 3. Cut studs 1/2 inch short of full height to provide perimeter relief.
 - 4. Align and plumb partition framing accurately.
 - 5. Where partitions abut ceiling or deck construction or vertical structural elements, provide slip or cushion type joint between partition and structure as recommended by stud manufacturer to prevent transfer of structural loads or movements to partitions, and to provide lateral support.
 - 6. Provide horizontal bracing where necessary for lateral support.
 - 7. [Chase walls:
 - a. Position steel studs on opposite sides of chase directly across from each other.
 - b. Cut cross-bracing from gypsum board 12 inches high by chase wall width.
 - 8. Backer plates and blocking:
 - a. Where handrails, grab bars, cabinets, wall-mounted door stops, or other wall-hung items are attached to partitions, install backer plates or wood blocking accurately positioned and firmly secured to metal studs, whether or not such backer plates or blocking are indicated on Drawings.
 - b. Do not use wood blocking in fire-rated construction.
 - 9. Curved partitions:
 - a. Cut top and bottom runners through leg and web at 2-inch intervals for arc length.
 - b. Bend runners to uniform curve of radius indicated and locate straight lengths tangent to arcs.

- c. Support outside (cut) leg of runners by clinching a 1-inch high x 25 gauge thick sheet steel strip to inside of cut legs using metal lock fasteners.
 - d. Attach studs to runners with 3/8 inch long pan head framing screws.
 - e. On straight lengths at ends of arcs, place studs 6 inches on center with last stud left free standing.
- C. Hat Channel Furring:
 - 1. Attach hat-shaped furring channels either vertically or horizontally with fasteners through alternate wing flanges (staggered).
 - 2. Space furring channels at 24 inches on center, unless otherwise indicated. Where furring is indicated to receive backer board, water resistant gypsum board with ceramic tile, or veneer plaster, space at 16 inches on center.
 - 3. Install furring channels within 4 inches of floor line and ceiling line.
- D. Z-Furring:
 - 1. Securely attach narrow flanges of members to wall with concrete stub nails or power-driven fasteners, except as otherwise indicated.
 - 2. Sequence furring installation with installation of insulation.
- E. Ceiling and Soffit Support Systems:
 - 1. Secure hangers or rods to structural support by connecting directly to structure where possible; otherwise connect to inserts, clips or other anchorage devices or fasteners indicated.
 - 2. Space main runners, hangers and furring according to requirements of ASTM C754, except as otherwise indicated.
 - 3. Where spacing of structural members, or width of ducts or other equipment, prevents regular spacing of hangers, provide supplemental hangers and suspension members and reinforce nearest affected hangers to span extra distance.
 - 4. Attach directly to structural elements only; do not attach to metal deck. Loop hangers and wire tie directly or provide anchors or inserts.
 - 5. Install compression posts, splay wires and other accessories as required to comply with seismic requirements.
 - 6. Extend runners to within 6 inches of walls.
 - 7. Wire-tie or clip furring members to main runners and to other structural supports indicated. In fire resistance rated assemblies, wire-tie furring members; do not clip.
 - 8. Do not permit furring or runners to contact masonry or concrete walls.
 - 9. Provide 1 inch clearance between furring or runners and abutting walls and partitions.
 - 10. For proprietary framing system, comply with manufacturer's instructions.
 - 11. Curved (vaulted) applications:
 - a. Install furring channels to provide indicated radius for finished ceiling.
 - b. Space furring channels maximum 16 inches on center. Provide closer spacing if recommended by manufacturer for veneer base thickness and application method.
- F. Shaftwall:
 - 1. Provide slip or cushioned joints to isolate shaftwall system. Comply with manufacturer's instructions.
 - 2. Seal joints and penetrations on both sides of shaftwall system.
 - 3. Elevator shaft requirements:
 - a. Support elevator hoistway door frames independently of shaftwall framing system, or reinforce system in accordance with system manufacturer's instructions.
 - b. Where shaftwall system cannot be positioned within 2 inches of shaft face of structural beams, floor edges and similar projections into elevator shaft, provide continuous 5/8 inch gypsum board cants to cover tops of projections.

3.04 BOARD INSTALLATION

- A. Single Layer Gypsum Board on Metal Studs:
 - 1. Loosely butt gypsum board joints together and neatly fit.
 - 2. Do not place butt ends against tapered edges.
 - 3. Maximum allowable gap at end joints: 1/8 inch.
 - 4. Stagger joints on opposite sides of partitions.
 - 5. Apply ceiling boards first where gypsum board ceilings and wall occur.
 - 6. Cut openings in gypsum board to fit electrical outlets, plumbing, light fixtures and piping snugly and small enough to be covered by plates and escutcheons. Cut both face and back paper.
 - 7. Screw board in place securely with screws spaced according to manufacturer's recommendations.
- B. Single Layer Gypsum Board on Furring:
 - 1. Apply gypsum board with long dimension at right angles to furring channel.
 - 2. Center end joints over channel web; stagger end joints from those in adjacent rows of board.
 - 3. Fasten boards to furring channels with screws spaced according to manufacturer's recommendations.
- C. Double Layer Gypsum Board:
 - 1. Fasten base layer to studs or furring with screws, and attach face layer using laminating adhesive and screws, applied according to manufacturer's instructions.
 - 2. Offset face-layer joints at least 10 inches from parallel base-layer joints.
 - 3. Screw both layers to metal supports at double layer ceiling applications and where required for fire-rated construction.
- D. Direct Gypsum Board Adhesive Application:
 - 1. Apply adhesive with manufacturer's recommended spreader to backs of gypsum boards in band of four beads each to center of each board and along edges.
 - 2. Position boards vertically and press firmly in place to insure good bond.
 - 3. Fasten top and bottom of board if required.
- E. Water-Resistant Gypsum Board:
 - 1. Complete plumbing rough-in before gypsum board panels are erected.
 - 2. Separate gypsum panels from rough-in and fixtures by 1/4 inch space.
 - 3. Make necessary cut-outs and seal cut or exposed panel edges with thinned-down ceramic tile adhesive or with waterproof flexible sealant, as recommended by gypsum board manufacturer.
 - 4. Install water-resistant board horizontally.
 - 5. Do not place water-resistant board directly over vapor retarder.
 - 6. Prior to tile application, fill openings around pipes, fittings, fixtures, interior angles and other penetrations with waterproof flexible sealant, as recommended by gypsum board manufacturer. Do not fill 1/4 inch gap at bottom of panels.
- F. Cementitious Backer Board Installation:
 - 1. Install as indicated to comply with ANSI A108.11 and in accordance with manufacturer's instructions.
 - 2. Complete plumbing rough-in before boards are erected.
 - 3. Separate board from rough-in and fixtures and fill space as recommended by manufacturer.
 - 4. Securely fasten boards to substrate as required.
 - 5. Follow manufacturer's instructions for treatment of edge terminations.

6. At joints and corners, embed fiberglass tape in skim coat of mortar.
- G. Exterior Soffits:
1. Apply soffit board with long dimension across supports.
 2. Position end joints over supports.
 3. Allow at least 1/4 inch between edge of soffit board and adjacent construction, unless otherwise indicated.
 4. Fasten with corrosion-resistant screws.
- H. Gypsum Shaftwall:
1. Erect gypsum board shaft liner for use as temporary shaft enclosure.
 2. Screw attach base and face layers according to manufacturer's instructions, for both vertical (shaft enclosure) and horizontal (duct enclosure) applications.
 3. Seal perimeters and openings to provide airtight installation.
 4. Install sloped gypsum board cants on hoistway side of shaftwall where slabs or beams project beyond shaftwall.
- I. Curved Gypsum Board:
1. Provide board length such that one single board covers curved surface. Provide board thickness as recommended by manufacturer for minimum bending radius.2. Install boards perpendicular to framing.
 2. On concave installations, start fastening board at center of curve and work outward to ends of boards.
 3. On convex installations, begin board installation at one end of curved surface and fasten board to framing as it is wrapped around curve.
 4. Do not cut openings for penetrations until boards are installed and thoroughly dry.

3.05 SOUND-RATED CONSTRUCTION

- A. Insulation:
1. Install sound attenuation blankets in sound-rated partitions and ceilings where indicated.
 2. Completely fill space between studs and framing to full height of partition wall or full area of ceiling.
 3. Fit carefully behind electrical outlets and other work penetrating sound-rated construction.
 4. Install sound attenuation blankets in gaps between steel deck flutes and tops of sound-rated partitions, which are not fire-rated. Attach blankets in accordance with manufacturer's instructions.
- B. Gypsum Board:
1. Install gypsum board same as for interior partitions and ceilings.
 2. Coordinate with installation of perimeter sealants.
- C. Acoustical Sealant:
1. At partition walls, provide continuous beads of acoustic sealant at juncture of both faces of runners with floor and ceiling construction, and wherever gypsum board abuts dissimilar materials, prior to installation of gypsum board.
 2. At ceilings, provide continuous beads of sealant wherever gypsum board abuts dissimilar materials.
 3. Provide continuous bead of sealant behind faces of control joints prior to installation of control joint accessories.
 4. After installation of gypsum board base layers, cut face layer sheets 1/2 inch less than floor-to-ceiling height and position with 1/4 inch open space between gypsum board and floor, ceiling and dissimilar vertical construction. Fill 1/4 inch open space with continuous sealant beads after installation of face layer.

5. At openings and cutouts, fill open spaces between gypsum board and fixtures, cabinets, ducts and other flush or penetrating items, with continuous bead of sealant.
 6. Seal sides and backs of electrical boxes to completely close off openings and joints.
- D. Sound Flanking Paths:
1. Where sound-rated partition walls intersect non-rated gypsum board partition walls, extend sound-rated construction to completely close sound flanking paths through non-rated construction.
 2. Seal joints between face layers at vertical interior angles of intersecting partitions.

3.06 ACCESSORY INSTALLATION

- A. Trim:
1. Use same fasteners to anchor trim accessory flanges as required to fasten gypsum board to supports, unless otherwise recommended by trim manufacturer.
 2. Install metal corner beads at external corners.
 3. Install metal casing bead trim whenever edge of gypsum board would otherwise be exposed or semi-exposed.
- B. Control Joints:
1. Install control joints at junction of gypsum board partitions with walls or partitions of other finish material.
 2. Install control joints within long runs of partitions, ceilings or soffits at approximately 30'-0" on center or as indicated.
 3. Where gypsum board is vertically continuous, as at stairwells, provide horizontal control joints at each floor level.
- C. Special Trim: Install as indicated on drawings and in accordance with manufacturer's instructions.

3.07 FINISHING

- A. Provide levels of gypsum board finish for locations as follows, in accordance with Gypsum Association GA 214, "Recommended Specification: Levels of Gypsum Board Finish".
1. Level 1: Ceiling plenum areas and concealed areas, except provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings.
 2. Level 2: Gypsum board substrate at tile, except remove tool marks and ridges.
 3. Level 3: Gypsum board surfaces, where textured finishes or heavy vinyl wall papering will be used High-build Primer required as specified in Section 099123.
 4. Level 4: Gypsum board surfaces, except where another finish level is indicated High-build Primer required as specified in Section 099123.
 5. Level 5: Gypsum board surfaces requiring extra smooth surface for critical light, where indicated using spray-applied Primer-Surfacer or watered-down joint compound skim coat over whole surface and High-build Primer required as specified in Section 099123.
 - a. Surface Preparation: Complete gypsum board surface to Level 4 before applying primer - surfacer.
 6. Primer-surfacer Application: Machine apply with airless sprayer in conformance with USG application instructions to a wet film thickness of 15 to 20 mils or 9 to 12 mils dry film thickness. Surface may be painted after overnight drying
- B. Interior Gypsum Board:
1. Prefill:
 - a. Use setting-type joint compound. Mix joint compound according to manufacturer's directions.
 - b. Fill joints between boards flush to top of eased or beveled edge.
 - c. Fill joints of gypsum board above suspended ceilings in fire-rated partitions.

- d. Wipe off excess compound and allow compound to harden.]
- 2. Taping (Level 1):
 - a. Use taping or all purpose [conventional weight, lightweight or midweight] compound.
 - b. Butter taping compound into inside corners and joints.
 - c. Center tape over joints and press down into fresh compound.
 - d. Remove excess compound.
 - e. Tape joints of gypsum board above suspended ceilings.
- 3. First coat (Level 2):
 - a. Use taping or all-purpose [conventional weight, lightweight or midweight] drying-type compound, or setting-type joint compound.
 - b. Immediately after bedding tape, apply skim coat of compound over body of tape and allow to dry completely in accordance with manufacturer's instructions.
 - c. Apply first coat of compound over flanges of trim and accessories, and over exposed fastener heads and finish level with board surface.
- 4. Second coat (Level 3): Use all purpose or topping (conventional weight, lightweight or midweight) drying type joint compound. After first coat treatment is dried, apply second coat of compound over tape and trim, feathering compound 2 inches beyond edge of first coat.
- 5. Third coat (Level 4):
 - a. Use all purpose or topping conventional weight, lightweight or midweight drying type joint compound.
 - 1) After second coat has dried, sand surface lightly and apply thin finish coat to joints, fasteners and trim, feathering compound 2 inches beyond edge of second coat.
 - 2) Allow third coat to dry. Apply additional compound, and touch-up and sand, to provide surface free of visual defects, tool marks, and ridges, and ready for application of finish.
- 6. Skim coat (Level 5):
 - a. Apply skim coat of all-purpose (conventional weight) drying-type compound or spray-applied Primer-Surfacer over exposed surfaces of gypsum board.
 - b. After skim coat has dried, touch-up and sand to provide surface free of visual defects, tool marks, and ridges, and ready for application of finish.]
- 7. Water-Resistant Gypsum Board: Treat fastener heads and joints with setting-type joint compound.
 - a. For joints to be covered with tile, apply tape and joint compound bedding coat and skim coat only; do not apply finish coats.
 - 1) Do not crown joints or leave excess compound on panels.
 - 2) Remove tool marks and ridges.
 - 3) For fastener heads to be covered with tile, apply one coat of joint compound.]
- 8. Cementitious Backer Board: Prepare and finish joints in accordance with manufacturer's instructions.

3.08 ADJUSTING

- A. Correct damage and defects which may telegraph through finish work.
- B. Leave work smooth and uniform.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Description of Work: Work of this Section includes, but is not limited to, the following:
 - 1. Metal suspension systems.
 - 2. Trim and accessories.
- B. SUBMITTALS
 - 1. Product Data: Submit manufacturer's specifications and installation instructions with Project conditions and materials clearly identified or detailed for each required system.
- C. SYSTEM REQUIREMENTS
 - 1. Performance Requirements: Fabricate and install systems as indicated but not less than that required to comply with ASTM C754 under the following conditions:
 - a. A pre-engineered drywall suspension system consisting of straight main tees (for Wall-to-Wall system) or straight main tees and straight furring cross tees, that join together to support screw attached interior gypsum panels and independently supported light fixtures, and air diffusers, where applicable. Where applicable, installed systems must conform to Underwriters Laboratories, Inc. (UL) Fire Resistance Design No. indicated on the drawings.
 - b. Maximum deflection of L/360 of distance between supports.

1.02 QUALITY ASSURANCE

- A. Reference Standards
 - 1. ASTM C635, Standard Specifications for Metal Suspension Systems
 - 2. ASTM C636, Recommended Practice for Installation of Metal Suspension Systems.
 - 3. Cisca Ceiling Systems Installation Handbook
 - 4. ASTM C1186, Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets. [Include if DUROCK panels are used, otherwise delete]
 - 5. ASTM C1278, Standard Specification for Fiber-Reinforced Gypsum Panels [Include if FIBEROCK Sheathing is used, otherwise delete]
 - 6. ASTM C645, Standard Specification for Non-Bearing (Axial) Steel Studs, Runners, (Track), and Rigid Furring Channels for Screw Application of Gypsum Board
 - 7. ASTM C754, Specification for Installation of Steel framing Members to Receive Screw-Attach Gypsum Boards
 - 8. ASTM C840 Specification for Application & Finishing of Gypsum Board.
 - 9. ASTM C841 Specification for Installation of Interior Lathing & Furring
 - 10. ASTM C842 Specification for Application of Interior Gypsum Plaster
 - 11. ASTM C843 Specification for Application of Gypsum Veneer Plaster
 - 12. ASTM C844 Specification for Application of Gypsum Base to Receive Gypsum Veneer Plaster
 - 13. (ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials)
 - 14. (Underwriters Laboratories Inc. (UL) Fire Resistance Directory)

1.03 SUBMITTALS

- A. Samples: Submit actual samples and technical data for suspension system main tees and cross tees for review. Submit technical data for interior gypsum panels
- B. Shop Drawings:
 - 1. Reflected ceiling plans: Submit ceiling suspension system layout indicating dimensions, lighting fixture locations, and related mechanical components.

2. Assembly drawings: Indicate installation details, accessory attachments and installation of related lighting fixtures and related mechanical system components.
- C. Manufacturer's Data:
 1. System Details: Submit manufacturer's catalogue cuts or standard drawing showing details of system with project conditions clearly identified and manufacturer's recommended installation instructions

1.04 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
 1. Deliver material to site promptly without undue exposure to weather.
 2. Deliver in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade.
- B. Inspection:
 1. Promptly inspect delivered materials, file freight claims for damage during shipment, and order replacement materials as require. Any damaged materials shall be promptly removed from the job site
- C. Storage:
 1. Store above ground in dry, ventilated space.
 2. Protect materials from soiling, rusting and damage.
 3. Store board to be directly applied to masonry walls at 70°F for 24 hours prior to installation.
- D. Handling:
 1. Handle in such a manner to insure against racking, distortion or physical damage of any kind

1.05 PROJECT CONDITIONS

- A. Environmental Requirements:
 1. Do not install gypsum board when ambient temperature is below 40°F.
 2. For adhesive attachment of gypsum board, and for finishing of gypsum board, maintain ambient temperature above 55°F from one week prior to attachment or joint treatment, and until joint treatment is complete and dry.

1.06 ALTERNATE CONSTRUCTION WASTE DISPOSAL

- A. Reuse:
 1. Separate clean waste drywall pieces from contaminants for landfilling or recycling. Do not include vinyl faced, mold-resistant or asphalt impregnated gypsum boards. Pulverize and apply to site soil in accordance to landscape specifications. Protect scrapes and pulverized material from moisture and contamination. Alternate to on-site soil amendment, work to supply local farming granular material for their use.

1.07 RECYCLE:

- A. Separate clean waste drywall pieces from contaminants for landfilling or reuse. Working with local waste hauler and local drywall manufacturer, provide proper storage of waste for pickup and return. Protect scrapes material from moisture and contamination.

1.08 COORDINATION WITH OTHER WORK:

- A. General:

1. Coordinate with other work including mechanical and electrical work and partition systems. Installation of conduit and ductwork above suspension system shall be complete before installation of suspension system
- B. Protection:
 1. Follow good safety and industrial hygiene practices during handling and installing of all products and systems, with personnel to take necessary precautions and wear appropriate personal protective equipment as needed. Read Material Safety Data Sheets and related literature for important information on products before installation. Contractor to be solely responsible for all personal safety issues during and subsequent to installation; architect, specifier, owner and manufacturer will rely on contractor's performance in such regard

PART 2 - PRODUCTS

2.01 MANUFACTURER:

- A. All manufactured by USG (United States Gypsum Company, USG Interiors), Chicago, IL, USA, in compliance with applicable ASTM Standards.
 1. USG Drywall Suspension System
 2. USG Drywall Suspension System Wall-to-Wall

2.02 MATERIALS

- A. USG Drywall Suspension Systems - Commercial quality, cold-rolled steel, hot dipped galvanized finish:
 1. Main Tees: Fire-Rated Heavy Duty classification 1.617" high x 6 feet, 8 feet, 10 feet, 12 feet, 14 feet, and as required by the drawings long, integral reversible splice with knurled face. DGL-26 15/16" Face and 1-1/2" high.
 2. Cross Members: Fire-Rated members with knurled face. Cross Tees: DGLW-424 cross tee 1-1/2" high x 48" long with 1-1/2" wide face; quick release cross tee ends for positive locking and removability without tools.
 3. Accessory Cross Tees: Cross tees must have knurled faces and quick release cross tee ends for positive locking and removability without tools.
 - a. DGL-224 Fire-Rated 1-1/2" high x 24" long with 15/16" face
 - b. DGL-324 Fire-Rated 1-1/2" high x 36" long with 15/16" face
 - c. DGL-424 Fire-Rated 1-1/2" high x 48" long with 15/16" face
 - d. DGL-824 Non Fire-Rated 1-1/2" high x 96" long with 15/16" face
 - e. DGLW-224 Fire-Rated 1-1/2" high x 24" long with 1-1/2" face
 - f. DGLW-424 Fire-Rated 1-1/2" high x 48" long with 1-1/2" face
 4. Wall Moldings: Single web with knurled face
 - a. DGWM-16 1" x 1" x 144" long wall molding
 - b. DGCM-27 144" x 1-5/8" x 1" x 1" channel molding
 5. Accessories - Splice Clip DGSC-180
 - a. Compression Posts
 - 1) (VSA18/30 18" to 30")
 - 2) (VSA30/48 30" to 48")
 - 3) (VSA48/84 48" to 84")
 - 4) (VSA84/102 84" to 102")
 6. Wire: Hanger Wire (12 ga.), galvanized or as noted on drawings.
- B. USG Drywall Wall-to-Wall Suspension Systems - Commercial quality, cold-rolled steel, hot dipped galvanized finish for use in corridors and short span applications.
 1. Main Tees: Fire-Rated Heavy Duty classification 1.617" high x 6 feet, 8 feet, 10 feet, 12 feet, 14 feet, and as required by the drawings long, integral reversible splice with 1-1/2" knurled face.

2. Wall Moldings: Single web with knurled face, 1-1/2" x 1" x 12' Long, DGWM24
 3. Wall Moldings: Single web with knurled face, 1-5/8" x 1" x 12' Long. DGCM27.
- C. Grid Suspension Assemblies: Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL..

2.03 BOARD MATERIALS

- A. Gypsum Board: See Section 092900 - GYPSUM BOARD.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Examine substrates and adjoining construction and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.02 GENERAL INSTALLATION REQUIREMENTS:

- A. Standard reference: Install grid members in accordance with ASTM C636, CISCA installation standards, and other applicable references.
- B. Manufacturer's reference: Install in accordance with manufacturer's current printed recommendations.
- C. Drawing reference: Install in accordance with approved shop drawings and locate ceiling in accordance with main tee dimensions relative to elevations.
- D. Install in accordance with reference standards and manufacturer's instructions [, and as required to comply with seismic requirements].

3.03 APPLICATION INSTALLATION REQUIREMENTS:

- A. Flat Ceiling Applications:
1. Hanger Wire Installation: Secure hanger wires to upper structural elements and space hangers so that each hanger wire supports a maximum of 16 sq. ft.
 2. Space main tee members a maximum span of 48" on center (and/or as specified by the UL Fire Resistance Directory)
 3. Space cross tees recommended 16" o.c. Install extra cross tees where butt joints occur, 8" from each side of the butt joint
 4. Install compression struts per manufacturer's specifications and spacing, in accordance with wind load as applicable. Adjust main and cross tee spacing as necessary for loading conditions.
 5. Install fiber glass insulation in plenum, resting on top of main tees and cross members where indicated on the drawings.
 6. Do not install insulation within 3" of light fixtures unless fixtures are approved for use with insulation.
 7. Limit insulation thickness so that combined weight of supported panels and insulation on grid main tees does not exceed 16 plf
 8. Attach gypsum Board to the suspension system main runners, cross tees, and cross channels with 1-1/4" bugle head screws - single layer of board spaced 16" o.c. for gypsum Board, 8" o.c. for FIBEROCK and 6" o.c. for DUROCK in the field and at the perimeter of the panels, locate 3/8" in from panel edges. Hold panels in firm contact with framing while driving fasteners. Drive fastener heads flush with, or slightly below surface of gypsum Board and FIBEROCK panels. Drive fasteners so bottoms of heads are flush with surface of DUROCK Cement Panels.

9. Install trim, and similar accessories as necessary and as applicable to meet project requirements where indicated on drawings.
10. Install Control Joints at locations of properly detailed control joints, including additional cross tees as necessary, per direction of architect and/or design professional.
11. Finish boards as described to achieve 'Level of Finish' specified.
12. Corridor Wall-to-Wall Applications:
 - a. Hanger Wire Installation: Secure hanger wires to upper structural elements and space hangers so that each hanger wire supports a maximum of 16 sq. ft.
 - b. Space main tee members as required by span and design load
 - c. Attach gypsum Board, FIBEROCK Interior panels and DUROCK Cement Board to the suspension system main runners, cross tees, and cross channels with 1-1/4" bugle head screws - single layer of board spaced at 16" o.c. for gypsum Board, 8" o.c. for FIBEROCK and 6" o.c. for DUROCK, as applicable, in the field and at the perimeter of the panels, locate 3/8" in from panel edges. Hold panels in firm contact with framing while driving fasteners. Drive fastener heads flush with, or slightly below surface of gypsum Board and FIBEROCK panels. Drive fasteners so bottoms of heads are flush with surface of DUROCK Cement Panels.
 - d. Install trim, and similar accessories as necessary and as applicable to meet project requirements where indicated on drawings.
 - e. Install Control Joints at locations of properly detailed control joints, including additional cross tees as necessary, per direction of architect and/or design professional.
 - f. Finish boards as described to achieve 'Level of Finish' specified.
13. Curved, Vaults or Dome Applications:
 - a. Drawing reference: Install in accordance with approved shop drawings and locate ceiling in accordance with main tee dimensions relative to elevations.
 - b. Hanger Wire Installation: Secure hanger wires to upper structural elements and space hangers so that each hanger wire supports a maximum of 12 sq. ft.
 - c. Space main and cross tee members so the maximum span of metal lath is 12 inches.
 - d. Secure self-furring metal lath to tee members with screws spaced 6" o.c. max., applied at lath dimples. Lap metal lath ends and edges and secure with 18 gauge tie wire spaced 6 inches o.c.
 - e. Mix STRUCTO-BASE Gypsum Plaster with sand in proportions of 2 cu. ft. of sand per 100 lbs. of plaster for scratch and brown coats. Apply plaster to metal lath to a thickness of 5/8" (min.) Measured from the face of the lath.
 - f. Select a plaster mix for the finish coat to provide a smooth trowel or sand float Textured finish as indicated on the drawings or as specified.
 - g. Use templates to insure uniform and even curvature of the finished surface

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. Interior gypsum board.
 - 2. Fire resistive Type X Gypsum Board.
 - 3. Trim and Accessories.
 - 4. Joint treatment, tapes, compounds and finishing.
 - 5. Miscellaneous metal framing, furring, and fasteners.
 - 6. Sound attenuation insulation and acoustical sealants.
 - 7. All related items necessary to complete the work of this section.

1.03 SUBMITTALS

- A. Product Data: For each type of product.
- B. Submit manufacturers' product information, specifications, and installation instructions for the specified products including joint compounds, fasteners, trim, control joints, joint reinforcing, metal furring members, metal studs, tracks, runners, resilient clips, steel grounds, and all related accessories.
 - 1. Trim Accessories: Full-size Sample in 12-inch (300-mm-) long length for each trim accessory indicated.
- C. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.05 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels 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.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- 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.

2.02 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.03 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. National Gypsum Company.
 - 2. USG Corporation.
 - 3. Or approved equal.
- B. Gypsum Wallboard: ASTM C1396/C1396M.
 - 1. Thickness: 5/8 inch (15.9 mm) and 1/2 inch (12.7 mm).
 - 2. Long Edges: Tapered and featured (rounded or beveled) for Pre-filling.
- C. Gypsum Board, Type X: ASTM C1396/C1396M.
 - 1. Thickness: 5/8 inch (15.9 mm) and 1 inch (25.4 mm).

2.04 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 - 2. Shapes:
 - a. Cornerbead.
 - b. L-Bead: L-shaped; exposed long flange receives joint compound.
 - c. Expansion (control) joint.
- B. PVC Rip Bead L-Trim (VLZL) with tear-away strip to be removed after drywall finishing and painting to form a crisp, clean edge. 0.028 PVC material with 5/8 inch Tear away flange, 10 foot lengths with perforated flanges. Manufacturer: ClarkDietrich or approved equal.
- C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Fry Reglet Corp.
 - b. Gordon, Inc.
 - c. Pittcon Industries.
 - 2. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified or finish as specified on the drawings..

2.05 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - 3. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Pre-filling: 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.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.

2.06 MATERIALS

- A. Metal Framing: Protective coating of framing shall conform to ASTM A653/A653M - G40 minimum, or shall be a protective coating with equal or better corrosion resistance.
 - 1. Runners: In compliance with ASTM C645, provide 1-1/2" galvanized steel runners to match applicable assembly specified, to match wall framing members, unless indicated otherwise.
 - 2. Furring members: In compliance with ASTM C645, provide galvanized cold rolled steel, 0.0296" minimum thickness of base metal or 20 gage min., screw type hat shaped channels; 7/8" depth, width approx. 2 3/4", hemmed edges. Where furring channels are used in conjunction with resilient clips, width of channel shall be coordinated with clip configuration to ensure proper fit.
 - 3. Vertical Supports: 1" x 1/8" steel flat bars installed a maximum 4'-0" on center, slotted for 3/8" diameter bolts at each end. 3" x 3" x 3/16" steel angle, slotted to receive 3/8" diameter bolt and faster to truss above with a safe working load of 300 pounds minimum.
 - 4. Fasteners for Metal Framing: Provide fasteners of type, size, style, grade, holding power, class, and other properties required for secure installation of framing and furring. Galvanize all fasteners and accessories. All devices, other than bolts, used to interconnect ceiling members are required to be certified and listed by an Approved Agency.
- B. Fasteners: Fasteners for securing board to metal furring or wood shall be Phillips Head, black oxidized screws made for fastening gypsum wall board, size and length as recommended by the drywall manufacturer for the applications shown.

2.07 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

- C. Sound Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
- D. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining 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. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
 - b. Grabber Construction Products; Acoustical Sealant GSC.
 - c. Pecora Corporation; AC-20 FTR AIS-919.
 - d. USG Corporation; SHEETROCK Acoustical Sealant.
 - e. Approved Equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, 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 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 (1.5 mm) 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.
- 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. (0.7 sq. m) 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 (6.4- to 9.5-mm-) 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 (6.4 to 12.7-mm) 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.
- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations 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 for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.03 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Wallboard Type: As indicated on Drawings.
 - 2. Type X: As indicated on Drawings.
 - 3. Ceiling Type: As indicated on Drawings.
 - 4. Moisture- and Mold-Resistant Type: As indicated on Drawings.
 - 5. Glass-Mat Interior Type: As indicated on Drawings.
- B. 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 horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. 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 one framing member, 16 inches (400 mm) 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. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.04 CONSTRUCTION TOLERANCES

- A. Do not exceed 1/8" in 8'-0" variation from plumb or level in any exposed line or surface, except at joints between units do not exceed 1/16" variation between planes of abutting edges or ends. Shim as required to comply with specified tolerances. Variations shall not be visible in finished surfaces.
- B. For soffits and ceilings verify that direct suspension system has been installed properly, that main runners are spaced evenly and have been leveled to a tolerance of 1/8" in 12 feet measured both lengthwise on each runner and transversely between parallel runners so that furring member installation may proceed accurately.
- C. Water-Resistant Backing Board: Install where indicated with 1/4 inch (6.4 mm) gap where panels abut other construction or penetrations.

3.05 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 approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Exposed Edges: Where an exposed edge of gypsum drywall abuts dissimilar materials use Gold Bond #C250 casing bead or equal. Casing beads to be finished with joint compound. Same casing bead and joint treatment is to be used on exposed wallboard edges.
- D. Trim: 1/16 inch thick extruded aluminum 6063-T5 mill finish manufactured by Gorden Inc. or approved equal:
 - 1. J-Trim: Model JD-58
 - 2. Control Joint: Model RD-5810
 - 3. Corner Joint: Model FD-5810
 - 4. F' Reveal: Model 412-5/8
 - 5. Reveal Trim: Series 900, Model 904 RT-12
 - 6. Trim Reveal: Series 300, Model 312-5/8.
- E. Neatly cut all openings so that they may be covered by plates and escutcheons.
- F. Place control joints consistent with lines of building spaces as directed.
 - 1. Gypsum Panel surfaces should be isolated with control joints or other means where:
 - a. Partition, furring or column fireproofing abuts a structural element (except floor) or dissimilar wall or ceiling;
 - b. Ceiling abuts a structural element, dissimilar wall or partition or other vertical penetration; construction changes or ceiling;
 - c. Construction changes within the plane of the partition or ceiling;
 - d. Partition or furring run exceeds 30 feet;
 - e. Ceiling dimensions exceed 50 feet in either direction;
 - f. The area within separate ceiling sections exceeds 2,500 sq. ft.;
 - g. Wings of "L", "U", and "T" shaped ceiling areas are joined;
 - 2. Penetrations of the gypsum panel diaphragm, such as door frames, borrowed-light openings, vents, grilles, access panels and light troffers, require additional reinforcement at the corners to distribute concentrated stresses if a control joint is not used.

3. Place edge trim where gypsum board abuts dissimilar materials. Use longest practical length.
4. Provide additional framing and blocking as required to support gypsum board at openings and cutouts, and to support built-in anchorage and attachment devices for other work.
5. Coordinate installation of joint sealers specified in Section 079200 at penetrations and where abutting different materials.
6. Cornerbead: Use at outside corners unless otherwise indicated.
7. LC-Bead: Use where indicated.
8. L-Bead: Use where indicated.

3.06 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. Pre-fill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated. All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Prepared surface shall be coated with a drywall primer/sealer prior to the application of finish paint.
 - a. Primer and its application to surfaces are specified in Section 099113 - Exterior Painting and 099123 - Interior Painting.
 3. Level 5: Where indicated on Drawings.
 - a. Primer and its application to surfaces are specified in Section 099113 - Exterior Painting and 099123 - Interior Painting.

3.07 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and 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.

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. Ceramic tile.
 - 2. Waterproof membrane.
 - 3. Metal edge strips.

1.03 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.04 PERFORMANCE REQUIREMENTS

- A. Dynamic Coefficient of Friction (DCOF AcuTest): For tile installed on walkway surfaces, provide products with the following values as determined by testing in accordance with ANSI A137.1, Section 9.6:
 - 1. Level Surfaces: Minimum 0.42.
 - 2. Step Treads: Minimum 0.42.
 - 3. Ramp Surfaces: 0.42.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product, signed by product manufacturer.

1.07 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.01 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.
- D. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

- F. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.
- G. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.02 TILE PRODUCTS

- A. Tile Type: Porcelain glazed floor tile.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. American Olean; Division of Dal-Tile International Inc.
 - b. Daltile; Division of Dal-Tile International Inc.: Ayers Rock
 - c. Or approved equal.
 - 2. Face Size: 13 x 13
 - 3. Thickness: 3/8 inch (9.5 mm).
 - 4. Wearing Surface: Nonabrasive, smooth.
 - 5. Finish: Mat, clear glaze.
 - 6. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
 - 7. Grout Color: As selected by Architect from manufacturer's full range.
 - 8. For Furan-grouted quarry tile, pre coat with temporary protective coating.
 - 9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base Trim: 3 x 13 Bullnose or as indicated on the drawings

2.03 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Chlorinated Polyethylene Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030-inch (0.76-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. Noble Company (The); Nobleseal TS.
 - b. Or approved equal.
- C. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Laticrete International, Inc.; Laticrete 9235 Waterproof Membrane
 - b. MAPEI Corporation; Mapelastic AquaDefense with MAPEI Fiberglass Mesh.
 - c. Or approved equal.

2.04 SETTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.
 - 1. Cleavage Membrane: Asphalt felt, ASTM D226/D226M, Type I (No. 15); or polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.

2. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57-mm) diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.
 3. Latex Additive: Manufacturer's standard acrylic resin or styrene-butadiene-rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.
- B. Medium-Bed, Latex-Portland Cement Mortar: Comply with requirements in ANSI A118.4. Provide product that is approved by manufacturer for application thickness of 5/8 inch (16 mm) or as indicated on the drawings.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. MAPEI Corporation.
 - b. TEC; a subsidiary of H. B. Fuller Company.

2.05 GROUT MATERIALS

- A. Polymer-Modified Tile Grout: ANSI A118.7.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Laticrete International, Inc.
 - b. MAPEI Corporation
 - c. TEC; a subsidiary of H. B. Fuller Company.
 2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersable form, prepackaged with other dry ingredients.
 3. Polymer Type: Acrylic resin in liquid-latex form for addition to prepackaged dry-grout mix.
- B. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D. Use in Toilet Room Floor installations.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Laticrete International, Inc
 - b. MAPEI Corporation
 - c. TEC; a subsidiary of H. B. Fuller Company
 2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, and certified by manufacturer for intended use.
- C. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

2.06 ELASTOMERIC SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 079200 - JOINT SEALANTS.
1. Sealants shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.
- C. Multipart, Pourable Urethane Sealant for Use T: ASTM C920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Degussa Building Systems; Sonneborn Sonolastic SL 2
 - b. Pecora Corporation; Dynatrol II-SG.
 - c. Sika Corporation; Sikaflex-2c SL.
 - d. Tremco Incorporated; Vulkem 245.

2.07 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A666, 300 Series exposed-edge material.
- C. Temporary Protective Coating: Product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
 1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F (49 to 60 deg C) per ASTM D 87.
 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.
 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. Bonsal American; an Oldcastle company; Grout Sealer.
 - b. Bostik, Inc.; CeramaSeal Grout & Tile Sealer .
 - c. C-Cure; Penetrating Sealer 978.
 - d. Custom Building Products; Grout and Tile Sealer.
 - e. Jamo Inc.; Penetrating Sealer.
 - f. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.
 - g. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
 - h. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
 - i. TEC; a subsidiary of H. B. Fuller Company; TA-256 Penetrating Silicone Grout Sealer.

2.08 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.03 TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors composed of tiles 8 by 8 inches (200 by 200 mm) or larger.
 - c. Tile floors composed of rib-backed tiles.

- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/8 inch (1.6 mm).
 - 2. Porcelain Floor Tile: 3/16 inch (4.8 mm) minimum.
 - 3. Paver Tile: 1/8 inch.
 - 4. Glazed Porcelain Wall Tile: 1/8 inch (4.8 mm).
 - 5. Decorative Thin Wall Tile: 1/8 inch (1.6 mm).
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 - 2. Prepare joints and apply sealants to comply with requirements in Section 079200 - JOINT SEALANTS.
- I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - 1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).
 - 2. Do not extend waterproofing or crack isolation membrane under thresholds set in latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on waterproofing or crack isolation membrane with elastomeric sealant.
- J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
- K. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.04 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.05 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. For epoxy grout installations utilize recommended grout haze cleaner as recommended by the tile manufacturer. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.06 INTERIOR TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Tile Installation F114: Cement mortar bed (thickset) with cleavage membrane; epoxy grout; TCNA F114 and ANSI A108.1B.
 - a. Tile Type: Porcelain ceramic tile in Lobby, Kitchen and Toilet areas.
 - b. Thin-Set Mortar for Cured-Bed Method: Medium-bed, latex- portland cement mortar.
 - c. Grout: Water-cleanable epoxy grout.
 - 2. Tile Installation F121: Cement mortar bed (thickset) on waterproof membrane; TCNA F121 and ANSI A108.1C.
 - a. Tile Type: Porcelain ceramic tile.
 - b. Thin-Set Mortar for Cured-Bed Method: Medium-bed, latex- portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.

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. Ceramic and Porcelain tile.
 - 2. Waterproof membrane.
 - 3. Uncoupling Membranes.
 - 4. Metal edge strips.

1.03 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.04 PERFORMANCE REQUIREMENTS

- A. Dynamic Coefficient of Friction (DCOF AcuTest): For tile installed on walkway surfaces, provide products with the following values as determined by testing in accordance with ANSI standard ANSI A137.1, Section 9.6:
 - 1. Level Surfaces: Minimum 0.42.
 - 2. Step Treads: Minimum 0.42.
 - 3. Ramp Surfaces: 0.42.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Samples for Initial Selection: For each type of tile and grout indicated, provide full range of colors and patterns available from the approved manufacturer. Include Samples of accessories involving color selection.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer certifying that products meet or exceed the specified requirements of ANSI A137.1.
- C. Product Certificates: For each type of product, signed by product manufacturer.
- D. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.07 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.08 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum two years' experience.
- B. Single Source Responsibility: Obtain each type and color of tile from a single source. Obtain each type and color of mortar, adhesive and grout from the same source.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.01 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.
- D. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.
- F. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.
- G. Grout Release: High-performance, sacrificial, water-based coating to protect tile from grout residue and haze. Rinses with water during clean-up. Apply two coats and allow to cure for one-hour minimum prior to grouting. Installation and removal shall be as recommended by the manufacturer.
 1. Manufacturer: Mapei "UltraCare" Grout Release or approved equal.

2.02 TILE PRODUCTS

- A. Tile Type: Porcelain glazed floor tile.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. American Olean; Division of Dal-Tile International Inc.
 - b. Daltile; Division of Dal-Tile International Inc.: Ayers Rock
 - c. Or approved equal.
 2. Face Size: 13 x 13
 3. Thickness: 3/8 inch (9.5 mm).
 4. Wearing Surface: Nonabrasive, smooth.
 5. Finish: Mat, clear glaze.
 6. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
 7. Grout Color: As selected by Architect from manufacturer's full range.
 8. For Furan-grouted quarry tile, pre coat with temporary protective coating.
 9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base Trim: 3 x 13 Bullnose or as indicated on the drawings
- B. Glazed Wall Tile:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Daltile; Division of Dal-Tile International Inc: Colorwheel Linear.
 - b. Or approved equal.
 2. Module Size: 4 1/4 inch x 12 7/8 inch or as indicated on the drawings.
 3. Thickness: 5/16 inch.
 4. Face: Square edges.

5. Finish: Semi-Gloss.
6. Tile Color: Biscuit K175 and Desert Gray X114
7. Tile Pattern: As indicated on the drawings.
8. Moisture Absorption: less than 20% (wall)
9. Scratch Hardness (MOHS): 4.0 - 6.0.
10. Grout Joint Width: 1/16 inch.
11. Grout Color: As selected by Architect from manufacturer's full color range.
12. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes selected from manufacturer's standard shapes.

2.03 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9>ANSI A108/A118/A136.1 or ASTM C1325, in maximum lengths available to minimize end-to-end butt joints. Provide 2 inch wide coated glass fiber tape for joints and corners.
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Custom Building Products; Wonderboard.
 - b. USG Corporation; DUROCK Cement Board.
 2. Thickness: 5/8 inch or as indicated.

2.04 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Chlorinated Polyethylene Sheet: Non-plasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030-inch (0.76-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. Noble Company (The); Nobleseal TS.
 - b. Or approved equal.
- C. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Laticrete International, Inc.; Laticrete 9235 Waterproof Membrane.
 - b. MAPEI Corporation; Mapelastic AquaDefense with MAPEI Fiberglass Mesh.
 - c. Or approved equal.
- D. MAPEI – Mapeguard WP200
 1. Description: Flexible polyethylene sheet membrane with polypropylene fabric on both sides with a low perm rating ideal for vapor protection in showers, wet areas, and steam rooms. Thickness is 0.02" (40 -50 mils nominally), blue in color.
 2. Waterproofing seaming membrane:
 - a. Provide MAPEI Mapeguard WPST Seam Tape and Mapeguard PIC & POC Corners material 0.004" (4 mil) thick, polyethylene membrane, with polypropylene fleece laminated on both sides.
 3. Waterproofing Accessories:
 - a. Provide MAPEI Mapeguard VC, (Valve seals).
 - b. Provide MAPEI Mapeguard PC, (Pipe seals).
- E. Schluter®-KERDI or approved equal.

1. Description: 0.008" (8 mil) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides, which meets or exceeds the requirements of the "American National Standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation A118.10," and is listed by cUPC®, and is evaluated by ICC-ES (see Report No. ESR-2467 and PMG 1204).
2. Waterproofing seaming membrane:
 - a. Provide Schluter®-KERDI-BAND Seams and Corners material 0.004" (4 mil) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides.
3. Waterproofing Accessories:
 - a. Provide Schluter®-KERDI-SEAL Mixing Valve seals.
 - b. Provide Schluter®-KERDI-SEAL pipe seals.

2.05 SETTING MATERIALS

- A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Laticrete International, Inc.
 - b. MAPEI Corporation; Keraflex Super
 - c. TEC; a subsidiary of H. B. Fuller Company.
 2. Provide prepackaged, dry-mortar mix containing dry, redispersable, vinyl acetate or acrylic additive to which only water must be added at Project site.
 3. Provide prepackaged, dry-mortar mix combined with acrylic resin liquid-latex additive at Project site.
 4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.
- B. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.
 1. Applications: Where indicated on drawings.
 2. Products:
 - a. Custom Building Products; EBM-Lite Epoxy Bonding Mortar: www.custombuildingproducts.com/#sle.
 - b. LATICRETE International, Inc; LATICRETE LATAPOXY 300 Adhesive: www.laticrete.com/#sle.
 - c. MAPEI Corporation; Kerapoxy 410
 - d. Merkrete, by Parex USA, Inc; Merkrete Pro Epoxy: www.merkrete.com/#sle.

2.06 GROUT MATERIALS

- A. Polymer-Modified Tile Grout: ANSI A118.7.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Laticrete International, Inc.
 - b. MAPEI Corporation; Ultracolor Plus FA
 - c. TEC; a subsidiary of H. B. Fuller Company.
 2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersable form, prepackaged with other dry ingredients.
 3. Polymer Type: Acrylic resin in liquid-latex form for addition to prepackaged dry-grout mix.
- B. Water-Cleanable Epoxy Grout: ANSI A118.8, 100 percent solids with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D. Provide at Toilet Room Floors and locations indicated on the Drawings.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Laticrete International, Inc.

- b. MAPEI Corporation.
- c. TEC; a subsidiary of H. B. Fuller Company.
- 2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, and certified by manufacturer for intended use.

C. Grout for Pre-grouted Tile Sheets: Same product used in factory to pre-grout tile sheets.

2.07 ELASTOMERIC SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 079200 - JOINT SEALANTS.
 - 1. Sealants shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.
- C. Multi-part, Pourable Urethane Sealant for Use T: ASTM C920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Degussa Building Systems; Sonneborn Sonolastic SL 2.
 - b. Pecora Corporation; Dynatrol II-SG.
 - c. Sika Corporation; Sikaflex-2c SL.
 - d. Tremco Incorporated.; Vulkem 245.

2.08 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A666, 300 Series exposed-edge material.
- C. Decorative Color Coated Tile Edge and Finishing Profiles: Schluter®-RONDEC, symmetrically rounded visible surface with 1/4" radius bullnose profiles with integrated trapezoid-perforated anchoring leg and integrated grout joint spacer; extruded aluminum with color-coated finish color and height as selected by the architect. Provide inside and outside corner connectors and special shapes for a complete installation.
- D. Temporary Protective Coating: Product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
 - 1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F (49 to 60 deg C) per ASTM D 87.
 - 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
 - a. MAPEI Corporation; "UltraCare" Grout Release

- E. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
 - 1. Products:
 - a. MAPEI Corporation; "UltraCare" Everyday Stone, Tile & Grout Cleaner
- F. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.
 - 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. Bonsal American; an Oldcastle company; Grout Sealer.
 - b. Bostik, Inc.; CeramaSeal Grout & Tile Sealer.
 - c. C-Cure; Penetrating Sealer 978.
 - d. Custom Building Products; Grout and Tile Sealer.
 - e. Jamo Inc.; Penetrating Sealer.
 - f. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.
 - g. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
 - h. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
 - i. TEC; a subsidiary of H. B. Fuller Company; TA-256 Penetrating Silicone Grout Sealer.

2.09 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Protect surrounding work from damage.
- C. Remove any curing compounds or other contaminants.
- D. Vacuum clean surfaces and damp clean.
- E. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1a and is sloped 1/4 inch per foot (1:50) toward drains.
- F. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- G. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, pre coat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.03 TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors composed of tiles 8 by 8 inches (200 by 200 mm) or larger.
 - c. Tile floors composed of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.

2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
 4. For Plank type tiles, install staggered in a "running bond" brick joint pattern with no more than 33 % overlap to prevent lippage and warping.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Ceramic Mosaic Tile: 1/8 inch (1.6 mm).
 2. Porcelain Floor Tile: 3/16 inch (4.8 mm) minimum.
 3. Paver Tile: 1/8 inch.
 4. Glazed Porcelain Wall Tile: 1/8 inch (4.8 mm).
 5. Decorative Thin Wall Tile: 1/8 inch (1.6 mm).
 6. Quarry Tile: 1/4 inch (6.3 mm)
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 - JOINT SEALANTS.
- I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
- J. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.04 TILE BACKING PANEL INSTALLATION

- A. Install cementitious backer units and treat joints according to ANSI A118.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.05 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.06 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. For epoxy grout installations utilize recommended grout haze cleaner as recommended by the tile manufacturer. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be

- cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
 - C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed. After seven days, cover areas subject to construction traffic with heavy cardboard.
 - D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.07 INTERIOR TILE INSTALLATION SCHEDULE

- A. Interior Wall Installations, Metal Studs or Furring:
 1. Tile Installation W244: Thin-set mortar on cementitious backer units or fiber cement underlayment; TCNA W244F.
 - a. Tile Type: Glazed Porcelain wall tile.
 - b. Thin-Set Mortar: Latex- portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.

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 for ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

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.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: Set of full-size Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch (150-mm) long Samples of each type, finish, and color.

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.
 - 3. Hold-Down Clips: 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.
- C. Provide manufacturer's 1-year limited warranty covering defects in materials and / or factory workmanship for Acoustical canopy 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/SEI 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 (400 mm) 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 (ROCKFON - WET AREAS)

- A. Basis-of-Design Product Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 1. Roxul Rockfon: Koral
 2. Or approved equal.
- B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 1. Type and Form: Type XX, Stone wool base with membrane-faced overlay and factory painted glass scrim surface.
 2. Pattern: 'E' or as indicated by manufacturer's designation.
- C. Color: White.
- D. LR: Not less than 0.86.
- E. NRC: Not less than 0.85.
- F. CAC: Not less than 22.
- G. R Value: 2.2
- H. Edge/Joint Detail: Square Tegal.
- I. Thickness: 5/8 inch (19 mm).
- J. Modular Size: 24 by 24 inches (610 by 610 mm).
- K. Fire Class: A

2.04 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 Flat Hangers: 1/4 inch diameter, 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, 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 or equal) 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 or equal).
- L. Retention Clips: Provide Armstrong 414 Retention Clips in Gymnasium and Activity spaces. Install as recommended by the manufacturer to secure each panel.
- M. Shadow Reveal Transition Molding: Provide in size to match the adjacent grid field in 10 foot lengths, 1 1/4" height and width as determined by field grid. Armstrong 7901 for 9/16" grid and 7902 for 15/16" grid.

2.05 METAL SUSPENSION SYSTEM - 15/16 GRID

- 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:
- B. 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 and 360 Painted Grid.
 - 2. CertainTeed Corp.
 - 3. Chicago Metallic Corporation.
- C. 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 for acoustical panel installations.
 - b. Color as selected by the Architect for the 360 Painted Grid system.
- D. Suspended Ceiling Grid Moldings: StyleStix TM - Rigid PVC; Sag, mold, mildew and bacteria resistant; snap-on grid and perimeter moldings (Items #1310, 1311 and 1312) in lengths required. System connects to a standard 15/16" grid suspension system with wall molding profile. The StyleStix system shall have the following physical characteristics:
1. Dimensions: 1 1/2 inch wide x 3/4 inch deep x 72 inch long (#1310)
 2. Sag Resistance: HumiGuard Plus.
 3. Fire Rating: Class A
 4. Anti-microbial: Mold, Mildew and Bacteria resistant
 5. Durability: Soil, scratch and impact resistant
 6. Material: PVC
 7. Finish: White, paintable surface.
 8. Warranty: Limited Lifetime manufacturer's warranty.

2.06 METAL EDGE MOLDINGS AND TRIM

- 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:
- B. 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.
 2. Chicago Metallic Corporation.
 3. USG Interiors, Inc.; Subsidiary of USG Corporation.
- C. 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.

2.07 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 C 834 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 CISC'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 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. Factory-finished wood flooring.
 - 2. Sound control underlayment.

1.03 REFERENCES

- A. ASTM E648 –Standard Test Method for critical Radiant Flux of Floor Covering systems using a radiant heat energy sources 0.45 watts/cm² or greater, Class 1.
- B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- C. ASTM F710 - Practice for Preparing Concrete Floors.
- D. ASTM F2170 - Standard test method for determining relative humidity in concrete slabs using In-Situ-probes.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each type of floor assembly and accessory. Include plans showing pattern layout(s), details, transitions and attachments to other work. Include expansion provisions and trim details.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors and finishes available for wood flooring.
- D. Installer Certification: Submit a list of at least three installations successfully completed within the past year requiring the same general degree of installation expertise.

1.05 MAINTENANCE

- A. Initial Care: Remove any adhesive residue or petroleum based products with the appropriate cleaner (low odor mineral spirits). Urethane adhesive should be removed with the appropriate urethane adhesive cleaner. Thoroughly clean the floor with manufacturer approved Hardwood and Laminate Floor Cleaner. Dampen a CLEAN cloth with the materials, do not soak. DO NOT USE dirty mops or those that contain the residue of dust attracting compounds. Dust mop the floor as normal, misting the materials periodically while proceeding throughout the installation.
- B. Routine Care (daily) - Clean the floor as needed with manufacturer's recommended Hardwood and Laminate Floor Cleaner.
- C. Periodic Care (weekly-monthly) - Dust mop the floor as recommended under daily care. Buff the floor using a medium high speed buffer (175-750 RPM) and white/buff colored buffing pads. Apply manufacturer's recommended Hardwood and Laminate floor cleaner to the surface in the path of the buffing machine using a misting bottle while proceeding throughout the installation.

1.06 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- B. Wood Flooring: Equal to 10 percent of amount installed for each type of wood flooring indicated.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Installer: Shall be experienced in the wood and/or vinyl tile flooring industry and shall have a minimum of five (5) years experience in the installation of similar products
- C. Build mockup of typical flooring area including base and shoe moldings.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Approved mockups may not become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver the flooring to a preferred 35-55% relative humidity job site in unopened cartons. Protect flooring from exposure to moisture. Moisture producing activities such as drywall, concrete, masonry, painting and grouting must be complete and cured prior to the delivery of wood flooring.
- B. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

1.09 PROJECT CONDITIONS

- A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.
 - 1. Environmental Conditioning: Maintain an ambient temperature between 65 and 75 deg F and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
 - 2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.
 - a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
 - b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.
- B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.
- C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

1.10 WARRANTY

- A. Performance Plus Engineered Hardwood Flooring Warranties:
 - 1. Provide manufacturer's 10-Year Limited Commercial Warranty.
 - 2. Full Lifetime Structural Integrity Warranty.
 - 3. Full lifetime adhesive bond warranty is also offered when using Armstrong approved recommended adhesives

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. FloorScore Compliance: Wood floors shall comply with requirements of FloorScore Standard.

2.02 FEILD-FINISHED WOOD FLOORING

- A. Certified Wood: Provide wood flooring 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."
- B. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
 - 1. Armstrong Performance Plus Commercial Hardwood Plank Flooring
 - 2. Architect Approved Equivalent.
- C. Product Information:
 - 1. Species: Red Oak.
 - 2. Thickness: 3/4 inch.
 - 3. Width: 2 1/4 inch, match existing
 - 4. Lengths: Vary from 12 inch to 96 inch.
 - 5. Construction: Solid Hardwood
 - 6. Edge Style: T&G
 - 7. Pattern: Rectangular.
 - 8. Finish: Stain, Provide samples for final approval
 - a. Color: As selected by Architect from manufacturer's full range.
 - b. Gloss: Provide samples for final approval

2.03 SOUND CONTROL UNDERLAYMENT

- A. Sound Control Underlayment: Sound reducing underlayment consisting of impact-absorbing materials. Minimum Impact Insulation Class (IIC) of 50 when tested according to ASTM E492.

2.04 ACCESSORY MATERIALS

- A. Vapor Retarder: ASTM D4397, polyethylene sheet not less than 6.0 mils thick.
- B. Wood Flooring Fastening: Floors to be glued and nailed per manufacturers recommendations
- C. Fasteners: As recommended by manufacturer, but not less than that recommended in NWFA's "Installation Guidelines: Wood Flooring."
- D. Thresholds and Saddles: Flush transitions
- E. For moisture remediation on concrete slabs tested with ASTM method F 1869 exceeding maximum Hardwood requirement of 3 lbs/1000 ft²/24 hr period, not to exceed 12 lbs/1000 ft²/

24 hr Moisture Vapor Emission Rate (MVER) use Armstrong VapArrest (S-135) Professional Moisture Retardant System. For Glue down installations over S-135 use the recommended Urethane adhesives only.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Wood Subfloors
 - 1. Must be dry, clean, structurally sound, flat to within 3/16" in 10 ft., well nailed and/or glued, free of voids and with flat joint alignment.
 - 2. The wood subflooring materials should not exceed 13% moisture content. Using a reliable wood moisture meter, check the moisture content of the subfloor.
 - 3. Ensure that all nail heads are set flush with or below surface.
 - 4. Must be sanded smooth to remove varnish, high edges, chips, or other contaminants. Use thick 5/8" (16mm) or 3/4" (19mm) APA-CDX grade underlayment plywood or equivalent.
 - 5. Allow 1/8"-1/4" (3,2-6,4mm) expansion space between sheets with staggered joints. Leave 3/4" (19mm) minimum expansion space at all vertical obstructions
- D. All Subfloors
 - 1. Coordinate work with that of other trades prior to installation so that no discrepancies exist with the installation of doors, frames, saddles, floor drains or any materials that would interfere in any other way
 - 2. Notify Architect of moisture test results and any unsatisfactory conditions. Do not begin installation until unsatisfactory conditions have been corrected. Beginning the installation means that the substrate and job site conditions have been accepted as suitable. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the sub-floor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.02 PREPARATION

- A. Remove coatings, including curing compounds, and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- B. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 INSTALLATION

- A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines: Wood Flooring".
- B. Provide expansion space at walls and other obstructions and terminations of flooring of not less than 3/4 inch or as recommended by the flooring manufacturer.
- C. Vapor Retarder: Comply with NOFMA's "Installing Hardwood Flooring" for vapor retarder installation and the following:

1. Wood Flooring Installed Directly on Concrete: Install a layer of polyethylene sheet according to flooring manufacturer's written instructions.
- D. Sound Control Underlayment: Install over vapor retarder in accordance with manufacturer's written instructions.
- E. Spread adhesive using recommended trowel per manufacturer's instructions.
- F. Always install while adhesive is still wet.
- G. Spread adhesive only over surface that can be finished within working time of the adhesive.
- H. Scribe, cut and fit to permanent fixtures, columns, walls, partitions, pipes, outlets and built-in furniture and cabinets leaving the manufacturer's required expansion space. Install the flooring with adhesives, tools and procedures in strict accordance with the manufacturer's written instructions. Follow the recommended adhesive trowel notching, open times and working times. If mechanical fastening the flooring follow the correct fastener and staples as provide in the manufacturer's instructions.
- I. Install trim, molding and transition strips per manufacturer's installation instructions.

3.04 PROTECTION

- A. Protect finished floor from abuse by other trades using heavy kraft paper or equivalent. Do not use plastic sheet or film that might cause condensation. Keep traffic out of spaces and areas where flooring is being installed until adhesive has set. Light foot traffic after 10-12 hours. Normal traffic after 24 hours.
 1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Refinishing of existing wood auditorium floor as indicated on the drawings.
 - a. Two (2) coats of Wood Floor Finish.
 - b. Removal and reinstallation of floor accessories as required.
 - 1) Complete removal of existing finish at wood auditorium floor and complete refinishing as indicated on the drawings:
 - (a) Three (3) coats of Wood Floor Sealer
 - (b) Two (2) coats of Wood Floor Finish
 - (c) Removal and reinstallation of floor accessories as required.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Detailed technical product data for all products.
 - 2. Material Safety Data Sheets for all products.
 - 3. Submit written statements of compatibility from manufacturers if products by different manufacturers are applied.
- B. Documentation of existing conditions:
 - 1. Field verify and document existing conditions, including all dimensions and layout information. Provide scaled and accurate drawing(s) to Owner.
 - 2. Provide photo documentation of areas of damage (gouges, mars, split boards, etc.) present in the existing floor that the Contractor does not expect would be remedied by refinishing work.
- C. Samples:
 - 1. Submit samples for each type of finish, demonstrating full range of variation to be anticipated in finished work.
 - 2. Provide three (6), 2'-0" x 2'-0" samples for Architect approval prior to ordering any materials.
- D. Quality Control Submittals:
 - 1. Manufacturer's installation and finishing instructions.
 - 2. Provide at least three (3) project references of similar work scope with contact information to the Architect.
 - 3. Layout Plans and description of work methodology.
 - 4. Contract Closeout Submittals:
 - a. Operations and Maintenance Data:
 - 1) Manufacturer's maintenance recommendations.
 - 2) List of maintenance products recommended by flooring manufacturer and contact information as necessary for Owner to obtain products.

1.04 QUALITY ASSURANCE

- A. Qualifications:

1. Contractor shall have not less than 10 years of successful experience in finishing/refinishing wood floors.
 2. Contractor shall provide not less than 5 references complete with contact information necessary for Architect to verify reference.
 3. Contractor shall be an accredited member of the Maple Floor Manufacturers Association MFMA (PUR).
- B. Manufacturers Requirements and Recommendations:
1. The requirements and recommendations of specific products applied during the refinishing process are to be followed in all respects.
 2. All products are to be applied at coverage rates recommended by the manufacturer.
 3. Do not thin or reduce products unless Manufacturer's instructions specifically direct this to be required.
 4. Compatibility of all materials for proper adhesion and performance that are applied during the refinishing process must be verified by the Contractor prior to any application. Contractor shall provide written statements from Manufacturers indicating compatibility to Owner. Contractor shall apply test areas to check for proper adhesion of materials and to verify previous coatings are not attacked by subsequent coatings or finishes as required. If poor adhesion or attack of coatings occurs, the Contractor shall be responsible for all necessary remedies at their own expense.
- C. Preinstallation Conference:
1. Conduct conference at project site for the purpose of a final review of the contract documents, manufacturer's instructions, and materials to be used. Contractor shall bring copies of instructions and recommendations from manufacturer and distribute to those in attendance.
 2. Attendance: The contractor, other trades or manufacturers representatives as deemed appropriate by the contractor, and the Architect.
 3. Examine actual conditions of environment and existing substrates to determine whether they are satisfactory for work to proceed.
 4. Examine the contract documents and compare with manufacturer's current printed installation recommendations and instructions. Notify the Architect of any discrepancies or conflicts prior to execution of any work to receive resolution.

1.05 DELIVERY, STORAGE AND HANDLING

- A. All materials and products to be applied shall be delivered to the job site unopened in manufacturer's original packaging and containers.
- B. All products delivered to the job site must be dated within the shelf-life approved by the manufacturer. Contractor will ascertain that the installation shall be completed prior to printed expiration date.
- C. Delivery tickets for all materials shall be provided to the Owner's Representative upon request.
- D. Store materials at locations within the building as directed by the Owner's Representative.

1.06 PROJECT CONDITIONS

- A. Environmental Requirements: Contractor shall coordinate with the Owner to maintain ambient temperature between 65 and 70 degrees F during entire refinishing process.
- B. Do not apply any coatings if temperatures or humidity levels are not within limits set by the approved product manufacturer.

- C. Follow all manufacturer recommendations regarding handling of dust and mineral and oil-soaked rags. All materials that may pose hazard of spontaneous combustion shall be removed from the building and properly disposed of by the Contractor on a daily basis.

1.07 WARRANTY

- A. Furnish manufacturer's standard warranty. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have in accordance with the Contract Documents and Agreements for this project.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers of the products indicated as acceptable in subsequent paragraphs are as follows. Other products or manufacturers may be considered by the Owner/Architect prior to bidding in accordance with Section 012500 - PRODUCT SUBSTITUTION PROCEDURES.
 - 1. Sika Corporation (Sika U.S.) – Lyndhurst, NJ
 - 2. Bona Kemi USA, Inc. – Aurora, CO
 - 3. Hillyard Industries, Inc. – St. Joseph, MO
 - 4. PoloPlaz, Inc. – Jacksonville, AR
- B. Wood Floor Sealer and Wood Floor Finish products selected for use by the Contractor shall be by a single manufacturer. Other products and accessories selected for use by the Contractor must be approved by the manufacturer of the sealer and finish products used on the Project.

2.02 WOOD FLOOR SEALER

- A. Description: National Wood Floors Association approved, low VOC (350 g/L VOC maximum) oil-modified sanding sealer formulated to seal wood and provide surface for finish coating.
- B. Acceptable Products:
 - 1. Sikafloor WP-11.1 Sports Floor Sealer.
 - 2. Bona Sport Seal 350.
 - 3. Hillyard 350 Wood Seal.
 - 4. PoloPlaz Low VOC Sealer.

2.03 WOOD FLOOR FINISH

- A. Description: National Wood Floors Association approved, low VOC (350 g/L VOC maximum) oil-modified urethane varnish formulated to provide durable, solid and protective film.
- B. Acceptable Products:
 - 1. Sikafloor WP-8.1 Sports Floor 350 Finish.
 - 2. Bona Sport Poly 350
 - 3. Hillyard 350 Gym Finish
 - 4. PoloPlaz Magnum Low VOC

2.04 FINISHING ACCESSORIES

- A. As recommended by manufacturer and required by installer for complete installation, including but not limited to:
 - 1. Lambswool and/or synthetic foam applicators.
 - 2. Tack rags with manufacturers recommended cleaner(s).
 - 3. Screens and sanding paper or pads in grades as recommended by manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine environment, substrates and working conditions.
 - 1. Inspect floor with Owner's Representative to identify split boards or other damage to floor surface, walls and base materials requiring repairs beyond the scope of refinishing.
 - 2. Verify that surfaces and working conditions are in accordance with manufacturer's recommendations.
 - 3. Correct unsatisfactory substrates and working conditions before proceeding with applications.

3.02 PREPARATION

- A. Remove all miscellaneous debris from floor, including but not limited to: gum, paints and masking and marker tapes.
- B. Remove all existing cove and floor base material around perimeter of wood floor(s). Base materials shall be handled as follows:
 - 1. Floor Base materials are scheduled to be replaced with new materials, remove and legally dispose of existing floor base materials off-site.
- C. Remove existing coverplates at all floor sleeve locations and existing thresholds at all doorways, protect, store and catalogue for reinstallation upon completion of the floor re-finishing work. Temporary cover floor openings flush with floor surfaces to preclude tripping hazards to workers.
- D. Countersink exposed fasteners to allow refinishing and avoid damage to tools and equipment.
- E. Close off all ventilation return ducts and grilles to prevent airborne contaminants from being drawn through ventilation systems. Schedule this work and closure of ventilation systems required with Owner's Representative.
- F. Post 11"x17" signs on all doors into the work area indicating "Floor Refinishing in Process, DO NOT ENTER".

3.03 PROTECTION DURING WORK

- A. Protect floor from moisture at all times.
- B. Do not permit traffic on floor after sanding and before completion of finish system, except for installers applying paints or finishes.
- C. Protect sanded floor with heavy kraft paper or other suitable covering to provide access for application of first coats. Do not use cover materials that may trap moisture vapor and cause condensation to form under the covering.
- D. Prohibit nonessential traffic on floors until work is complete. In all cases comply with manufacturer's curing and environmental requirements prior to allowing foot traffic on re-finished floor surfaces.
- E. Provide notification to Owner's Representative when both light foot traffic will be permitted and when regular athletic activities may be re-introduced.

3.04 COMPLETE REFINISHING PROCESS

- A. Fill all holes and imperfections with wood filler prior to sanding
- B. Initial Sanding and Finish Removal:
 - 1. Schedule sanding operations such that the first coat of sealer is completely applied on the same day that sanding is completed.
 - a. Machine-sand existing flooring down to bare wood with 3 grades of sandpaper (course, medium, fine) to remove offsets and nonlevel conditions, ridges, cups, and sanding machine marks which would be noticeable in any manner after finishing. Screen floor using orbital disc sander with fine grit screen after sanding.
 - b. Use edge sander for areas of floor that cannot be reached with drum sander. Use hand sanders for areas that cannot be reached with edge sander.
 - c. Floor shall be completely smooth after initial sanding process. Contractor shall provide additional cuts if floor is not smooth after three (3) cuts.
- C. Dust Removal:
 - 1. Thoroughly vacuum entire floor and areas around, including doors, windows, sills and corners to remove dust.
 - 2. Perform final dust removal using a tack rag. Remove all traces of dust from floor, doors, window sills, overhead structures, diffusers grilles and ceilings etc.
 - 3. Inspect floor to ensure that surfaces are free of drum stop marks, gouges, streaks or shiners, are clean and completely free from sanding dust, and are acceptable for finishing in accordance with the manufacturer's instructions.
- D. Seal Coats:
 - 1. Do not begin application of seal coating until dust removal is complete.
 - 2. Apply first coat of sealer on the same day that sanding is completed.
 - 3. Apply coats within the time limits for recoating recommended by manufacturer and at manufacturers recommended rates.
 - 4. Application:
 - a. Apply first coat of sealer to floor per manufacturer's instructions.
 - b. Allow sealer to dry a minimum of 12 hours before proceeding unless manufacturer recommends otherwise. Allow additional dry time if recommended by manufacturer or if ambient conditions require.
 - c. Perform a buffing/sanding operation over entire floor with an orbital buffer and fine grade screen sanding disc.
 - d. Remove dust from floor using vacuum and tack rag as described under Dust Removal.
 - e. Apply second and third coats of sealer to floor per manufacturer's instructions, allowing sealer to dry and performing buffing/sanding operation and dust removal after each seal coat.
- E. Finish Coat:
 - 1. Apply coat within the time limits for coating recommended by the manufacturer. If time limits are exceeded, provide additional sanding/buffing and dust removal as required by manufacturer.
 - 2. Do not commence application of finish coat until dust removal is complete.
 - 3. Do not allow any coating materials to puddle.
 - 4. Typically apply finish coat in direction of wood grain.
 - 5. Apply finish to floor per manufacturer's instructions and rates of application.
 - 6. Allow finish to dry a minimum of 72 hours and verify that dry coating conditions exist prior to permitting any foot traffic on the surfaces.

3.05 RE-COATING PROCESS

- A. Clean floor surface of dirt, dust and mop treatments using a neutral cleaner and allow the floor to dry thoroughly.
- B. Perform a buffing/sanding operation with an orbital buffer and fine grade screen sanding disc as necessary to remove glossed surface and to allow proper adhesion of new finish coat to existing finish.

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. Allstate Rubber Corp.
 - 3. Burke Mercer Flooring Products, Division of Burke Industries Inc.
 - 4. Johnsonite; A Tarkett Company
 - 5. Or approved equal.
- B. Product Standard: ASTM F1861, Type TS (Thermoset Vulcanized Rubber).
 - 1. Group: 1 (solid, homogeneous).
 - 2. Style and Location:
 - a. Style A, Straight: Provide in areas with carpet.
 - b. Style B, Cove: Provide in areas with resilient flooring.
- C. 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.
- D. Thickness: 0.125 inch (3.2 mm).
- E. Height: 6 inch or as indicated on Drawings.
- F. Lengths: Coils in manufacturer's standard length.
- G. Outside Corners: Preformed.
- H. Inside Corners: Preformed.
- I. 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. Luxury Vinyl Tile.
 - 2. Vinyl Enhanced Tile

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2017.
- B. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials; 2017a.
- C. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2013a.
- D. ASTM F1861 - Standard Specification for Resilient Wall Base; 2016.
- E. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2016a.
- F. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2017.
- G. ISO 9001 - Quality management systems -- Requirements; 2015.
- H. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2018).
- I. ASTM F970 - Standard Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading; 2017.
- J. Install resilient floor tiles in accordance with the recommended method of the "Tile Contractors Association of America" Handbook.
- K. Federal specification SS-T-312B(1) Type IV composition product.

1.04 ACTION 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 LVT, Carpet Tile, and VET 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 LUXURY VINYL TILE - URETHANE FINISH

- A. Critical Radiant Flux (CRF): Minimum 0.45 watts per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
- B. Smoke Developed: Smoke value 450 or less based on NBS Smoke Chamber Test when tested in accordance with ASTM E662.
- C. Products:
 - 1. Mannington LVT
 - 2. Armstrong World Industries, Inc. _____
 - 3. Johnsonite; A Tarkett Company
 - 4. TOLI International
 - 5. Or approved equal.
- D. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
- E. Tile Standard: ASTM F1700.
 - 1. Class: Class II - Surface Decorated and Class III - Printed Film.
 - 2. Type: B - Embossed Surface.
- F. Static Load Limit: 250 psi
- G. Coefficient of Friction: 0.6 - exceeds ADA Guidelines.
- H. Recommended Level of use: On Grade, Above Grade, and Below Grade
- I. Wear Layer thickness: 0.040 inch
- J. Total Thickness: 0.157 inch.
- K. Size: As selected by the Architect.
- L. Colors and Patterns: As selected by the Architect from the manufacturer's full color range.
- M. Warranty: Provide Manufacturer's Limited Warranty that material will be free from manufacturing defects for a period of 6 years from the date of Substantial Completion. Additionally, the warranty shall cover discoloration from mold, mildew and alkali.

2.03 VINYL ENHANCED TILE

- A. Products and Product Data meeting the requirements of this specification may be submitted by one of the following manufacturers for review by the Architect for this project:

1. Johnsonite: A Tarkett Company:: Color Essence and Color Essence Slip Resistant - Basis of Design
 2. Armstrong World Industries, Inc.
 3. TOLI International
 4. Or approved Equal
- B. Resilient Vinyl Enhanced Tile Flooring
1. Color Essence and Color Essence Slip Resistant – Resilient Vinyl Enhanced Tile Flooring with the following physical characteristics:
 - a. Complies with requirements for ASTM F 1066, Class 3 (Surface Pattern) Standard Specification for Vinyl Composition Floor Tile.
 - b. Wear layer/Overall thickness: 1/8" (3.2 mm)
 - c. Tile size: 12" x 12" (30.5 x 30.5 cm)
 - d. Slip Resistance: ADA Compliant
 - e. Polyurethane Reinforced wear surface with Tritonite Finish
 - f. ASTM F970, Standard Test Method for Static Load Limit – 400 PSI (modified for higher load).
 - g. ASTM E648, Standard Test method for Critical Radiant Flux of 0.45 watts/cm² or greater, Class I.
 - h. Color Essence slip resistant tile shall be provided as indicated on the drawings.
 - i. Color Essence shall be installed with Tarkett 800 Pressure Sensitive Adhesive in accordance with the manufacturers requirements.
 - j. Vinyl Enhanced Tiles contain 23% pre-consumer and 6% post-consumer recycled content.
 - k. Phthalate-free.
 - l. 100% Recyclable.
 - m. SCS FloorScore® Certified and meets California Specifications Section 01350.
 - n. Johnsonite facilities shall be ISO 9001 and ISO 14001 Certified.
 - o. Color/Pattern: As selected by architect from manufacturer's full line of Color Essence and Color Essence Slip Resistant tile.

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 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 modular, fusion-bonded 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.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104.

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.
- 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: Lifetime (MainBoard - Infinity Modular)
 - a. 15 Year (Xguard) against staining.
 - b. 15 Year ColorSafe warranty against color loss from bleach spills

PART 2 - PRODUCTS

2.01 CARPET TILE - MANNINGTON COMMERCIAL

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 1. MANNINGTON "MAINBOARD INFINNITY MODULAR".
 2. Or approved equal.
- B. Color: As selected by Architect from manufacturer's full range.

- C. Pattern / Installation: Audio Tag 12401 / Horizontal Brick Ashlar.
- D. Fiber Content: Invista Antron Lumena Type 6, 6 Nylon.
- E. Pile Characteristic: Pattern Loop.
- F. Dye Method: Solution
- G. Gauge: 5/64.
- H. Pile Thickness: 0.108"
- I. Average Density: 6,667; Weight Density = 133,334
- J. Tile Size: 24" X 24".
- K. Tufted Face Weight: 20 oz/ sq. yd.
- L. Stain Repel / Stain Resist/ Soil Release: XGUARD.
- M. Stitches: 9.5 stitches per inch
- N. Primary Backing: 100% Synthetic
- O. Secondary Backing: Infinity Modular Reinforced Composite Closed Cell Polymer with pre-consumer recycled content.
- P. General Performance Characteristics:
 - 1. Smoke Chamber (ASTM E662): Less than 450 (Flaming Mode).
 - 2. Radiant Panel (ASTM E648): Class I (Direct Glue).
 - 3. Methenamine Pill Test (ASTM D2859): Passes
 - 4. Dimensional Stability AACHEN Test: Passes
 - 5. Electrostatic Propensity (AATCC Test Method 134): Less than 3.0 KV
 - 6. CRI GREEN LABEL PLUS ID: GLP70522
 - 7. VOC Limits: Meets SCAQMD Rule #1168

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.

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 F710 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. 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. Install pattern 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 methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION

SECTION 098414 - ACOUSTIC STRETCHED-FABRIC WALL AND CEILING SYSTEMS - NOVAWALL
H2M

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Acoustic stretched-fabric wall system.
- B. Acoustic stretched-fabric ceiling system.
- C. Accessories as required for complete installation.

1.02 REFERENCE STANDARDS

- A. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2016.
- B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2017.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018a.
- D. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2016.
- E. ASTM E2573 - Standard Practice for Specimen Preparation and Mounting of Site-Fabricated Stretch Systems to Assess Surface Burning Characteristics; 2019.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Specimen warranty.
- C. Shop Drawings: Details indicating typical transitions to other finish surfaces.
- D. Selection Samples: Fabric swatches representing manufacturer's full range of available colors, textures, and patterns.
- E. Verification Samples:
 - 1. For each fabric specified, minimum size 12 inch square, representing actual product in color, texture, and pattern.
 - 2. Actual samples of each frame profile to be used, including transitions between dissimilar profiles.
 - 3. Acoustic material, minimum size 12 inch square.
 - 4. Accessory package.
- F. Test Reports: Certified test data from an independent test agency verifying that wall and ceiling systems meet specified requirements for acoustical and fire performance.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.

SECTION 098414 - ACOUSTIC STRETCHED-FABRIC WALL AND CEILING SYSTEMS - NOVAWALL
H2M

- I. Maintenance Contract.
- J. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- K. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Supply an additional 10 (ten) percent of accessories installed for Owner's use in maintenance of project.
 - 2. Supply an additional 5 (five) percent of fabric installed for Owner's use in maintenance of project.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect fabric, acoustical backing, and track from excessive moisture in shipment, storage, and handling.
- B. Do not deliver materials to project until wet work such as concrete and plaster has been completed.
- C. Store products in manufacturer's unopened packaging until ready for installation.
- D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 MOCK-UP

- A. See Section 014000 - Quality Requirements for additional mock-up requirements.
- B. Construct mock-up of acoustic stretched-fabric wall system at location indicated by Architect/Engineer.
 - 1. Minimum mock-up dimensions; 96 by 96 inches.
 - 2. Approved mock-up may remain as part of the Work.

1.07 FIELD CONDITIONS

- A. Do not begin installation until interior conditions have reached temperature and humidity that will be maintained during occupancy.
- B. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within five year period after Date of Substantial Completion.

SECTION 098414 - ACOUSTIC STRETCHED-FABRIC WALL AND CEILING SYSTEMS - NOVAWALL
H2M

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acoustic Stretched-Fabric Wall and Ceiling System:
 - 1. Novawall Systems, Inc; _____: www.novawall.com/#sle.
 - 2. Substitutions: See Section 016000 - Product Requirements.

2.02 ACOUSTIC STRETCHED-FABRIC SYSTEM

- A. Acoustic Stretched-Fabric System: Field installed, fabric is stretched and set into framework and laid over acoustic material anchored to substrate. Framework consists of continuous perimeter and intermediate mounting frames anchored to substrate, and designed to permit removal and replacement of fabric within framed areas without affecting adjacent areas.
 - 1. Surface Burning Characteristics: Flame Spread Index of 25, maximum; Smoke Developed Index of 450, maximum; when whole system is tested in accordance with ASTM E84 using mounting specified in ASTM E2573 for stretched systems.
 - 2. Noise Reduction Coefficient (NRC): 0.80, minimum, when tested in accordance with ASTM C423, Type A mounting per ASTM E795.
 - 3. Seams in fabric are not permitted; adjust frame layouts to accommodate width of fabric; obtain written approval of frame layouts from Architect/Engineer.
- B. Verify that adhesives and sealants used in installation of acoustic stretched-fabric system have acceptable low VOC emission ratings.

2.03 MATERIALS

- A. Frame: Extruded polymer framing system with serrated jaws of sufficient strength to hold fabric in place after repeated applications.
 - 1. Wall Frame Size: 1/2 inch height from wall substrate with minimum 1 inch wide base.
 - a. Wall Frame Shape: Square at perimeter, and square at intermediate abutting joints.
 - b. Application: Apply acoustic material to wall locations as indicated on drawings.
 - 2. Ceiling Frame Size: 1-3/8 inch height from ceiling substrate with minimum 1 inch wide base.
 - a. Ceiling Frame Shape: Square at perimeter, and square at intermediate abutting joints.
 - b. Application: Apply acoustic material, Type _____, to ceiling locations as indicated on drawings.
 - 3. Frame Color: As selected from manufacturer's standard colors.
- B. Acoustic Material:
 - 1. Provide type of acoustic material in thickness required to achieve Noise Reduction Coefficient (NRC) indicated.
 - 2. Ensure that thickness of acoustic material fills depth of frame as necessary for application without use of support blocking.
 - 3. Compressed Fiberglass Board: Class A fire rated in accordance with ASTM E84.
 - a. Overall Thickness: 1/2 inch.
 - b. Density: 6 lbs/cu ft.
 - c. Panel Size: Manufacturer's standard size, cut to fit.
 - 4. Multi-Density Fiberglass Board: Class A fire rated in accordance with ASTM E84.
 - a. Overall Thickness: 1/2 inch.
 - b. Density: 16 lbs/cu ft.
 - c. Panel Size: Manufacturer's standard size, cut to fit.

SECTION 098414 - ACOUSTIC STRETCHED-FABRIC WALL AND CEILING SYSTEMS - NOVAWALL
H2M

- C. Rigid Blocking: Fire-retardant treated medium density fiberboard complying with ANSI A208.2, in thickness to meet project requirements.
- D. Fabric: Heavy-duty fire-retardant commercial fabric, as provided by manufacturer of acoustic stretched-fabric system; color, pattern, and texture as selected from system manufacturer's fabric supplier's standard line of fabric.
- E. Fasteners: As recommended by manufacturer of acoustic stretched-fabric system in accordance with project requirements.
- F. Adhesives: Low VOC or water-based, and approved by acoustic stretched-fabric system manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Begin installation only after substrates have been properly prepared.
- B. Verify that casework, markerboards, door and window jambs, finished ceiling, and other finished items adjacent or abutting the acoustic stretched-fabric system have been properly installed.
- C. When preparation of substrate is the responsibility of another installer, notify Architect/Engineer of unsatisfactory preparation prior to proceeding with this work.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation of this work.
- B. Prepare substrate surfaces using methods as recommended by the manufacturer for achieving acceptable result as required for this work.
- C. Remove wall plates and other obstacles, and properly prepare substrates to receive frames and acoustic material in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install acoustic stretched-fabric system at locations indicated in accordance with approved shop drawings and manufacturer's instructions.
- B. Frames: Install perimeter and intermediate frames using appropriate fasteners for prepared substrate, firmly secured to ensure frames do not separate from substrate.
 - 1. For tile or masonry substrates, apply continuous bead of adhesive along base of framing in addition to spacing of conical anchors and/or fasteners at 6 to 8 inches on center.
 - 2. Follow contours of wall and scribe to adjoining work at borders, penetrations, and imperfections.
 - 3. Install framing around openings and penetrations.
 - 4. At outside corners, miter framing to allow installation of acoustic material and secure placement of fabric around corner without intermediate framework.
 - 5. Allow for spacing of framework to accommodate insertion of installation tool.
- C. Acoustic Material: Cut and trim acoustic material to fit snugly within perimeter and intermediate framework.
 - 1. Apply adhesive and press acoustic material into place, maintaining constant plane.

SECTION 098414 - ACOUSTIC STRETCHED-FABRIC WALL AND CEILING SYSTEMS - NOVAWALL H2M

2. Staple acoustic material as necessary to prevent air gaps and to maintain secure contact for full adhesion to substrate.
 3. At fixtures mounted within areas of acoustic stretched-fabric system, install rigid blocking for backing and maintain plane of fixture surface flush with face of acoustic stretched-fabric system.
- D. Fabric: Stretch fabric over acoustic material, locking edges of fabric into frame's serrated jaws using manufacturer's recommended tool. Maintain fabric weave plumb, level and true, in proper relation to building lines, without ripples, waviness, hourglass, or other deleterious effects.
1. Upon fabric installation, do not employ adhesives or mechanical fasteners of any type, and ensure fabric is free-floating and in contact with acoustic material as necessary.
 2. Stapling or gluing of fabric to cores or channel framework is not permitted.
 3. Provide tension in fabric sufficient to prevent sagging under anticipated changes in temperature and humidity.
 4. At outside corners, wrap as single piece of fabric without joints or seams.
 5. At ceiling applications, surface of fabric shall not deviate from established ceiling plane more than 1 inch in 20 feet.

3.04 CLEANING

- A. Clean exposed surfaces of acoustic stretched-fabric system in compliance with manufacturers instructions for cleaning and repair of minor damage to exposed surfaces.
- B. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of any damage to system.

3.05 PROTECTION

- A. Protect installed materials upon completion of this work, using methods that will ensure that the finished work is without damage or deterioration upon Date of Substantial Completion.

3.06 MAINTENANCE

- A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide a separate maintenance contract for specified maintenance service.

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 Masonry Units.
 - 2. Steel.
 - 3. Galvanized metal.
 - 4. Gypsum board.
 - 5. Wood.
 - 6. 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 REFERENCES

- A. GreenSeal GS-11; Latest Version.
- B. US Green Building Council, (USGBC) - Green Seal standards for LEED paint credits. USGBC LEED v4.1-BD+C
- C. Occupational Safety and Health Act (OSHA) - Safety Standards.
- D. American National Standards Institute (ANSI) - Performance Standards.
- E. Paint Decorating Contractors of America (PDCA) - Application Standard.
- F. National Paint and Coatings Association (NPCA) - Gloss Standard.
- G. American Society for Testing Materials (ASTM) - Testing Methods.
- H. Master Paint Institute (MPI #) - Established paint categories and standards.

- I. Ozone Transmission Commission (OTC) - Established levels of Volatile Organic Compounds. OTC II.
- J. SCAQMD 1168 - South Coast Air Quality Management District Rule #1168 with latest amendments.
- K. SSPC V1 (PM1) - Steel Structures Painting Manual, Vol. 1, Good Painting Practice; Society for Protective Coatings.
- L. SSPC V2 (PM2) - Steel Structures Painting Manual, Vol. 2, Systems and Specifications; Society for Protective Coatings.
- M. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Manufacturer's name, product name and/or catalog number, and general product category.
 - 2. Cross-reference to specified paint system(s) that the product is to be used in; include description of each system.
- B. Submit 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. VOC content.
- C. Samples: Submit three paper samples, 5 inches by 7 inches (127mm x 178mm) in size, illustrating selected colors for each color and system selected with specified coats cascaded.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.06 CLOSEOUT SUBMITTALS

- A. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as "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 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.

1.08 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.
- B. Installer Qualifications: All products listed in this section are to be applied by a Painting Contractor with a minimum of five years demonstrated experience in surface preparation and field application of the same type and scope as specified.
- C. 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.
 - b. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 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.

1.09 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.
- C. Disposal:
 - 1. Never pour leftover coating down any sink or drain. Use up material on the job or seal can and store safely for future use.
 - 2. Do not incinerate closed containers.
 - 3. For specific disposal or recycle guidelines, contact the local waste management agency or district. Recycle whenever possible.

1.10 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.

1.11 WARRANTY

- A. Inspection of all surfaces to be coated must be done by the manufacturer's representative to insure proper preparation prior to application. All thinners, fillers, primers and finish coatings shall be from the same manufacturer to support a product warranty. Products other than those submitted shall be accompanied by a letter stating its fitness for use and compatibility.
- B. At project closeout, provide to the Owner or owner's representative an executed copy of the Manufacturer's standard form outlining the terms and conditions of and any exclusions to their Limited Warranty against Manufacturing Defect.

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. (Basis of Design)
 - a. Benjamin Moore & Co. (United States), which is located at: 101 Paragon Dr; Montvale, NJ 07645; Toll Free Tel: 866-708-9181; Email: info@benjaminmoore.com; Web: <https://www.benjaminmoore.com> | <https://www.benjaminmoore.com/en-ca>
 - 2. Sherwin-Williams Company.
 - 3. PPG Architectural Finishes, Inc.

2.02 PAINT, GENERAL

- A. 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.
- B. VOC Content: Products shall comply with VOC limits of authorities (OTC II) 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. Non-Flat Paints and Coatings:	100 g/L.
3. Non-Flat High Gloss	150 g/L.
4. Dry-Fog Coatings:	150 g/L.
5. Primers, Sealers, and Undercoaters:	100 g/L.
6. Quick Dry Enamel	150 g/L.
7. Anti-corrosive and Antirust Paints Applied to Ferrous Metals:	250 g/L.
8. Zinc-Rich Industrial Maintenance Primers:	250 g/L.

9. Industrial Maintenance High Temperature	420 g/L.
10. Floor Coatings:	100 g/L.
11. Stains	250 g/L.
12. Varnish	275 g/L.
13. Waterproofing Sealer - Wood	275 g/L.
14. Waterproofing Sealer - Concrete	100 g/L.

- C. Colors: As selected by Architect from manufacturer's full range.
1. 30 percent of surface area will be painted with deep tones.

2.03 MIXING AND TINTING

- A. Except where specifically noted in this section, all paint shall be ready-mixed and pre-tinted. Agitate all paint prior to and during application to ensure uniform color, gloss, and consistency.
- B. Thinner addition shall not exceed manufacturer's printed recommendations. Do not use kerosene or other organic solvents to thin water-based paints.

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. Wood: 15 percent.
 - d. 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 BLOCK MASONRY (CMU)
 - 1. Latex Systems:
 - a. Satin Finish: Scuff-Resistant
 - 1) First Coat: Benjamin Moore Block Filler 0244, 8- 11 dry mils, (35 g/L), LEED Qualified.
 - 2) Second Coat: Benjamin Moore, Ultra Spec Scuff-X Interior Satin Finish 486, 1.7 DFT, (86 g/L), LEED V4 Credit.

- 3) Third Coat: Benjamin Moore, Ultra Spec Scuff-X Interior Satin Finish 486, 1.7 DFT, (86 g/L), LEED V4 Credit.
 - b. Satin Finish: Commercial Grade
 - 1) First Coat: Benjamin Moore Block Filler 0244, 8- 11 dry mils, (35 g/L), (a) LEED Qualified.
 - 2) Second Coat: Benjamin Moore Ultra Spec 500 Interior Semi-Gloss Finish N539, 1.8 DFT, 0 gm/l, LEED, LEED V4, MPI 43, 43 X-Green, 146, 146 X-Green, 140, 140 X-Green, CHPS
 - 3) Third Coat: Benjamin Moore Ultra Spec 500 Interior Semi-Gloss Finish N539, 1.8 DFT, 0 gm/l, LEED, LEED V4, MPI 43, 43 X-Green, 146, 146 X-Green, 140, 140 X-Green, CHPS
 - c. Low Sheen Finish: Scuff-Resistant
 - 1) First Coat: Benjamin Moore Block Filler 0244, 8- 11 dry mils, (35 g/L), LEED Qualified.
 - 2) Second Coat: Benjamin Moore, Ultra Spec Scuff-X Interior Matte Finish 484, 1.7 DFT, (82 g/L), LEED V4 Credit.
 - 3) Third Coat: Benjamin Moore, Ultra Spec Scuff-X Interior Matte Finish 484, 1.7 DFT, (82 g/L), LEED V4 Credit.
 - d. Low Sheen Eggshell Finish: Commercial Grade
 - 1) First Coat: Benjamin Moore Block Filler 0244, 8- 11 dry mils, (35 g/L), LEED Qualified.
 - 2) Second Coat: Benjamin Moore, Ultra Spec 500 Interior Low Sheen Eggshell Finish N537, 1.8 DFT, 0 gm/l, LEED, LEED V4, MPI 44, 138, 138 –Green, 144, 144 X-Green, CHPS
 - 3) Third Coat: Benjamin Moore, Ultra Spec 500 Interior Low Sheen Eggshell Finish N537, 1.8 DFT, 0 gm/l, LEED, LEED V4, MPI 44, 138, 138 –Green, 144, 144 X-Green, CHPS.
 - e. Flat Finish: Commercial Grade
 - 1) First Coat: Benjamin Moore Block Filler 0244, 8- 11 dry mils, (35 g/L), LEED Qualified.
 - 2) Second Coat: Benjamin Moore, Ultra Spec 500 Interior Latex Flat N536 (0 g/L), MPI # 53, X-Green 53, 143, X-Green 143, LEED 2009, LEED V4, CHPS Certified.
 - 3) Third Coat: Benjamin Moore, Ultra Spec 500 Interior Latex Flat N536 (0 g/L), MPI # 53, X-Green 53, 143, X-Green 143, LEED 2009, LEED V4, CHPS Certified.
- B. METAL: Aluminum, Galvanized.
- 1. Latex Systems:
 - a. Semi-Gloss Finish (Early Moisture-Resistant): Rust-Inhibiting
 - 1) First Coat: Benjamin Moore, Ultra Spec Acrylic Metal Primer HP04, 2.0 DFT (48 g/L), LEED, MPI 107, 107 X-Green, 134, CHPS
 - 2) Second Coat: Benjamin Moore, Ultra Spec HP D.T.M. Acrylic Semi- Gloss Enamel HP29 (147 g/L), MPI # 141, X-Green 141, 153, X-Green 153, LEED 2009, LEED V4.
 - 3) Third Coat: Benjamin Moore, Ultra Spec HP D.T.M. Acrylic Semi-Gloss Enamel HP29 (147 g/L), MPI # 141, X-Green 141, 153, X-Green 153, LEED 2009, LEED V4.
 - b. Semi-Gloss Finish: Commercial Grade
 - 1) First Coat: Benjamin Moore, Ultra Spec Acrylic Metal Primer HP04, 2.0 DFT (48 g/L), LEED, MPI 107, 107 X-Green, 134, CHPS
 - 2) Second Coat: Benjamin Moore, Ultra Spec 500 Interior Latex Gloss N540 (0 g/L), MPI # 54, X-Green 54, 147, 147 X-Green, 141, X-Green 141, LEED 2009, LEED V4, CHPS Certified.

- 3) Third Coat: Benjamin Moore, Ultra Spec 500 Interior Latex Gloss N540 (0 g/L), MPI # 54, X-Green 54, 147, X-Green 147, 141, X-Green 141, (a) LEED 2009, LEED V4, CHPS Certified
 - c. Low Sheen Finish (Early Moisture-Resistant): Rust-Inhibiting
 - 1) First Coat: Benjamin Moore, Ultra Spec Acrylic Metal Primer HP04, 2.0 DFT (48 g/L), LEED, MPI 107, 107 X-Green, 134, CHPS
 - 2) Second Coat: Benjamin Moore, Ultra Spec HP, DTM Acrylic Low Lustre Enamel HP25, 2.3 DFT, (45 g/L), MPI # 141, 141 X-Green, 153, 153 X- Green, LEED.
 - 3) Third Coat: Benjamin Moore, Ultra Spec HP, DTM Acrylic Low Lustre Enamel HP25, 2.3 DFT, (45 g/L), MPI # 141, 141 X-Green, 153, 153 X- Green, LEED.
 - d. Satin Finish: Scuff-Resistant
 - 1) First Coat: Benjamin Moore, Ultra Spec Acrylic Metal Primer HP04, 2.0 DFT (48 g/L), LEED, MPI 107, 107 X-Green, 134, CHPS
 - 2) Second Coat: Benjamin Moore, Ultra Spec Scuff-X Interior Satin Finish 486, 1.7 DFT, (86 g/L), LEED V4 Credit.
 - 3) Third Coat: Benjamin Moore, Ultra Spec Scuff-X Interior Satin Finish 486, 1.7 DFT, (86 g/L), LEED V4 Credit.
 - 2. Alkyd System (Water Base):
 - a. Semi-Gloss Finish:
 - 1) First Coat: Benjamin Moore, Ultra Spec Acrylic Metal Primer HP04, 2.0 DFT (48 g/L), LEED, MPI 107, 107 X-Green, 134, CHPS
 - 2) Second Coat: Benjamin Moore, Advance Waterborne Interior Alkyd Semi-Gloss 793 (48 g/L), LEED 2009, LEED V4, CHPS Certified.
 - 3) Third Coat: Benjamin Moore, Advance Waterborne Interior Alkyd Semi- Gloss 793 (48 g/L), LEED 2009, LEED V4, CHPS Certified.
- C. WOOD - (Walls, Ceilings, Doors, Trim):
- 1. Latex Systems:
 - a. Semi-Gloss Finish: Scuff-Resistant
 - 1) First Coat: Benjamin Moore, Fresh Start Multi-Purpose Latex 0023, 1.4 DFT, (44 g/L), LEED, MPI# 6, 17, 39, 137, CHPS.
 - 2) Second Coat: Benjamin Moore, Ultra Spec Scuff-X Interior Semi-Gloss Finish 487, (29 g/L), Qualifies for LEED V4, Qualifies for CHPS.
 - 3) Third Coat: Benjamin Moore, Ultra Spec Scuff-X Interior Semi-Gloss Finish 487, (29 g/L), Qualifies for LEED V4, Qualifies for CHPS.
 - b. Semi-Gloss Finish: Commercial Grade
 - 1) First Coat: Benjamin Moore, Fresh Start Multi-Purpose Latex 0023, 1.4 DFT, (44 g/L), LEED, MPI# 6, 17, 39, 137, CHPS.
 - 2) Second Coat: Benjamin Moore, Ultra Spec 500 Interior Latex Gloss N540 (0 g/L), MPI # 54, X-Green 54, 147, 147 X-Green, 141, X-Green 141, LEED 2009, LEED V4, CHPS Certified.
 - 3) Third Coat: Benjamin Moore, Ultra Spec 500 Interior Latex Gloss N540 (0 g/L), MPI # 54, X-Green 54, 147, X-Green 147, 141, X-Green 141, (a) LEED 2009, LEED V4, CHPS Certified
 - 2. Alkyd System (Water Base):
 - a. Semi-Gloss Finish:
 - 1) First Coat: Benjamin Moore, Fresh Start Multi-Purpose Latex 0023, 1.4 DFT, (44 g/L), LEED, MPI# 6, 17, 39, 137, CHPS.
 - 2) Second Coat: Benjamin Moore, Advance Waterborne Interior Alkyd Semi-Gloss 793 (48 g/L), LEED 2009, LEED V4, CHPS Certified.
 - 3) Third Coat: Benjamin Moore, Advance Waterborne Interior Alkyd Semi- Gloss 793 (48 g/L), LEED 2009, LEED V4, CHPS Certified.
 - 3. Stain and Varnish System: See Section 099300 - STAINING AND TRANSPARENT FINISHING.

D. GYPSUM BOARD - (Walls, Ceilings, Gypsum Board and similar items)**1. Latex Systems:****a. Eggshell / Pearl Finish: Scuff-Resistant**

- 1) First Coat: Benjamin Moore, Ultra Spec Masonry Interior/Exterior 100% Acrylic Sealer 608, 0.95 DFT, (46 g/L), LEED, MPI #3.
- 2) Second Coat: Benjamin Moore, Ultra Spec Scuff-X Interior Eggshell Finish 485, 1.7 DFT, (88 g/L), LEED V4 Credit.
- 3) Third Coat: Benjamin Moore, Ultra Spec Scuff-X Interior Eggshell Finish 485, 1.7 DFT, (88 g/L), LEED V4 Credit.

b. Low Sheen Finish: Scuff-Resistant

- 1) First Coat: Benjamin Moore, Ultra Spec 500 Interior Latex Primer N534, 1.8 DFT, (0 gm/L), LEED, LEED V4, MPI 50, 50 X-Green, 149, 149 X- Green, CHPS.
- 2) Second Coat: Benjamin Moore, Ultra Spec Scuff-X Interior Matte Finish 484, 1.7 DFT, (82 g/L), LEED V4 Credit.
- 3) Third Coat: Benjamin Moore, Ultra Spec Scuff-X Interior Matte Finish 484, 1.7 DFT, (82 g/L), LEED V4 Credit.

c. Low Sheen Eggshell Finish: Commercial Grade

- 1) First Coat: Benjamin Moore, Ultra Spec 500 Interior Latex Primer N534, 1.8 DFT, (0 gm/L), LEED, LEED V4, MPI 50, 50 X-Green, 149, 149 X- Green, CHPS.
- 2) Second Coat: Benjamin Moore, Ultra Spec 500 Interior Low Sheen Eggshell Finish N537, 1.8 DFT, 0 gm/l, LEED, LEED V4, MPI 44, 138, 138 –Green, 144, 144 X-Green, CHPS
- 3) Third Coat: Benjamin Moore, Ultra Spec 500 Interior Low Sheen Eggshell Finish N537, 1.8 DFT, 0 gm/l, LEED, LEED V4, MPI 44, 138, 138 –Green, 144, 144 X-Green, CHPS.

d. Flat Finish: Commercial Grade

- 1) First Coat: Benjamin Moore, Ultra Spec 500 Interior Latex Primer N534, 1.8 DFT, (0 gm/L), LEED, LEED V4, MPI 50, 50 X-Green, 149, 149 X- Green, CHPS.
- 2) Second Coat: Benjamin Moore, Ultra Spec 500 Interior Latex Flat N536 (0 g/L), MPI # 53, X-Green 53, 143, X-Green 143, LEED 2009, LEED V4, CHPS Certified.
- 3) Third Coat: Benjamin Moore, Ultra Spec 500 Interior Latex Flat N536 (0 g/L), MPI # 53, X-Green 53, 143, X-Green 143, LEED 2009, LEED V4, CHPS Certified.

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 application of wood finishes on the following substrates:
 - 1. Interior Substrates:
 - a. Dressed lumber (finish carpentry).
 - b. Exposed wood panel products.

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 indicated. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Product List: For each product indicated, include the following:
 - 1. Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the product proposed for use highlighted.
 - 3. VOC content.

1.05 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each finish system indicated and each color 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 type of finish system and substrate.

- a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
2. Final approval of stain color selections will be based on mockups.
 - a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.

1.06 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 (7 deg C).
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.07 FIELD CONDITIONS

- A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply finishes when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Benjamin Moore & Co.
 2. Sherwin-Williams Company (The).
 3. Pratt & Lambert.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the category indicated.

2.02 MATERIALS, 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 finish 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 finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior stains and finishes 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. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 2. Shellacs, Clear: VOC not more than 730 g/L.
 3. Stains: VOC not more than 250 g/L.
- D. Stain Colors: As selected by Architect from manufacturer's full range.

2.03 WOOD FILLERS

- A. Wood Filler Paste: MPI #91.

2.04 PRIMERS AND SEALERS

- A. Shellac: MPI #88.

2.05 STAINS

- A. Stain, Semi-Transparent, for Interior Wood: MPI #90.

2.06 POLYURETHANE VARNISHES

- A. Varnish, Interior, Polyurethane, Oil-Modified, Satin (Gloss Level 4): MPI #57.

2.07 SOURCE QUALITY CONTROL

- A. Testing of Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage the services of a qualified testing agency to sample wood finishing materials. Contractor will be notified in advance and may be present when samples are taken. If materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying wood finishes if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and refinish surfaces finished with rejected materials. Contractor will be required to remove rejected materials from previously finished surfaces before refinishing with complying materials if the two finishes are incompatible or produce results that, in the opinion of the Architect, are aesthetically unacceptable.

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.
- B. Maximum Moisture Content of Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- C. Maximum Moisture Content of Interior Wood Substrates: 13 percent, when measured with an electronic moisture meter.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with finish application only after unsatisfactory conditions have been corrected.
 - 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.02 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
 - 1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 - 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- D. Interior Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glass like finish.
 - 3. Sand surfaces that will be exposed to view and dust off.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.03 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for finish and substrate indicated.
 - 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
 - 3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.04 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.05 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

- A. Wood substrates, non-traffic surfaces, including wood-based panel products.
 - 1. Gloss Finish:
 - a. First Coat: Lenmar Waterborne Interior Wiping Stain 1WB.1300 (240 g/L), MPI # 186 LEED Credit.
 - b. Second Coat: Lenmar Aqua-Plastic WB Urethane Gloss C1WB.1400, 1) (245 g/L)
 - c. Third Coat: Lenmar Aqua-Plastic WB Urethane Gloss C1WB.1400, (245 g/L)

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. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Mold resistant coatings.
- B. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
 - 1. Section 061000 - ROUGH CARPENTRY for wood framing and sheathing.

1.03 SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Qualification Data: For Applicator.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
 - 1. Applicator must be trained and certified by manufacturer.
- B. Owner Mold Prevention Program: Refer to the Owner's mold prevention program exhibit attached to subcontractor agreement for additional requirements.
- C. Unit Mock-up: Provide materials, products, and components as specified herein for 1 complete unit mock-up. Refer to Section 014320 - PRE-INSTALLATION MEETINGS for additional requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Application instructions.
 - 6. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at ambient temperatures of 40 degrees F to 110 degrees F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.06 WARRANTY

- A. Treatment must be warranted for 25 years and must include a Manufacturers Backed 25-Year full remediation warranty on all treated areas. Insurance Co. shall have a minimum rating of A- or better.
- B. Warranty must be serialized and traced to the property address of application and must be enforceable without regard to ownership.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Board Defense as manufactured by InCide Technologies.
 - 2. FortiCel™ Mold & Mildew Preventive Coating as manufactured by Certainteed
 - 3. Approved equal.

2.02 APPLICATION

- A. Mold Protective Surface Treatments: Application treatment shall be applied to structural interior surfaces, including:
 - 1. Wood framing or structural components manufactured of wood.
 - 2. Sheathing, plywood, oriented strand board (OSB), Floor Joists, Wall Members

2.03 PRODUCT REQUIREMENTS

- A. Mold Protect Surface Treatments
 - 1. Surface Treatments shall be inorganic silica cross-link cured film structures.
 - a. V.O.C. must be "0"
 - 2. Coating shall have independent laboratory evidence of passing ASTM D5590 and must prevent spore germination
 - 3. Coating shall have independent laboratory evidence of prevention of germination as tested by MouldWorks Laboratory, Portland, OR according to MouldWorks Test Panel for testing of inherent mold resistance of coatings and their ability to prevent spore germination. See attached "Comparison of MouldWorks vs ASTM D5590.
 - 4. Laboratory testing must include evidence of independent evaluation of coating capability to prevent germination of each of the following species and results;

Mold Species	Black Enamel Control Sample	Coating Tested	Water Agar
<i>Acremonium sp.</i>	no germination	no germination	germination
<i>Aspergillus caespitosus</i>	germination	no germination	germination
<i>Aspergillus glaucus gp.</i>	germination	no germination	germination
<i>Aspergillus versicolor</i>	germination	no germination	germination
<i>Chaetomium globosum</i>	germination	no germination	germination
<i>Cladosporium sphaerospermum</i>	germination	no germination	germination
<i>Fusarium sp.</i>	germination	no germination	germination
<i>Paecilomyces variotii</i>	germination	no germination	germination
<i>Penicillium aurantiogriseum</i>	germination	no germination	germination
<i>Penicillium corylophilum</i>	germination	no germination	germination

<i>Penicillium decumbens</i>	germination	no germination	germination
<i>Stachybotrys sp.</i>	germination	no germination	germination
<i>Trichoderma longibrachiatum</i>	germination	no germination	germination
<i>Tritirachium oryzae</i>	germination	no germination	germination
<i>Ulocladium botrytis</i>	germination	no germination	germination

5. Surface Treatments shall have passed ASTM D3273 testing, with a zero mold growth (10) rating. And must be performed by a credible third party national laboratory.
6. Coating shall be tinted to verify coverage.

2.04 MATERIAL PREPARATION

- A. Mix materials strictly in accordance with manufacturer's most current printed technical literature.
- B. Thinning: NO THINNING is required for the FortiCel™ Mold & Mildew Preventive Coating
- C. Surface must be dry prior to application.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.02 PREPARATION

- A. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's written instructions for each particular substrate condition and as specified.
- B. Material Preparation: Mix and prepare coating materials according to manufacturer's written instructions.

3.03 APPLICATION

- A. Do not begin installation until substrates have been properly prepared.
- B. General: Apply coating according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

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. Room and door identification signs.

1.03 RELATED REQUIREMENTS:

- A. Section 015000 - TEMPORARY FACILITIES AND CONTROLS for temporary Project identification signs and for temporary information and directional signs.

1.04 DEFINITIONS

- A. Accessible: 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 for signs.

1.05 ACTION SUBMITTALS

- A. See Section 013300 - SUBMITTALS.
- B. Product Data: For each type of product.
- C. Shop Drawings: For panel signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- D. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.
 - 2. Provide manufacturer's full color palette in the form of a color deck or actual samples for selections by the Architect.
- E. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Room Identification Signs: Full-size Sample.
- F. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Sample Warranty: For special warranty.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

1.09 FIELD CONDITIONS

- A. Field Measurements: Verify locations of signage and field mounting surfaces in the field before fabrication, and indicate measurements on Shop Drawings.
- B. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- C. Maintain this minimum temperature during and after installation of signs.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within manufacturers specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PANEL SIGNS, GENERAL

- A. Regional Materials: Panel signs shall be manufactured within 500 miles (800 km) of Project site.

2.02 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- B. Accessibility Standard: 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 for signs.

2.03 INTERIOR SIGNAGE

- A. Manufacturer: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
 - 1. ASI Sign Systems, Inc.
 - 2. Best Sign Systems Inc.
 - 3. Mohawk Sign Systems.
 - 4. Precision Signs.
- B. Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Basis-of-Design Product: ASI Sign Systems, Inc.; InTac.
 - 2. Laminated-Sheet Sign: Sandblasted polymer face sheet with raised graphics laminated over subsurface graphics to acrylic backing sheet to produce composite sheet.
 - a. Composite-Sheet Thickness: 0.125 inch (3.18 mm).
 - b. Surface-Applied Graphics: Applied vinyl film paint.
 - c. Subsurface Graphics.
 - 3. Mounting: Surface mounted to wall with concealed anchors two-face tape.
 - 4. Surface Finish and Applied Graphics:
 - a. Integral Sheet Color: As selected by Architect from full range of industry colors.
 - b. Painted Finish and Graphics: Manufacturer's standard, factory-applied acrylic polyurethane, in color as selected by Architect from manufacturer's full range.
 - 5. Text and Typeface: Accessible raised characters and Braille Tags: Clear raster balls shall be drilled and tapped using ASI's Intac procedure and InTac Braille guide.
 - 6. Flatness Tolerance: Sign panel shall remain flat or uniformly curved under installed conditions as indicated and within a tolerance of plus or minus 1/16 inch (1.5 mm) Insert dimension measured diagonally from corner to corner.
- C. Room Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Basis-of-Design Product: ASI Sign Systems, Inc.; InTac.
 - 2. Laminated-Sheet Sign: face sheet with raised graphics laminated to backing sheet to produce composite sheet.
 - a. Composite-Sheet Thickness: As indicated Manufacturer's standard for size of sign 0.125 inch (3.18 mm).
 - b. Surface-Applied Graphics: Applied Graphics, Lettering and/or numerals: LPP Series individual, Acrylic. Dimensional Characters. Individual cut Acrylic letters (1/32 inch thick) with matte finish.
 - c. Subsurface Graphics: Subsurface painted Acrylic, .125 inch thick, matte first finish.
 - d. Grade 2 Braille Tags: Clear raster balls shall be drilled and tapped using ASI's Intac procedure and InTac Braille guide.
 - e. Color(s): As selected by Architect from manufacturer's full range.
 - 3. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition: Square cut.
 - b. Corner Condition in Elevation: Square.
 - 4. Mounting: Manufacturer's standard method for substrates indicated with concealed anchors as selected by the Architect.
 - 5. Text and Typeface: Accessible raised characters and Braille typeface as selected by Architect from manufacturer's full range.

2.04 PANEL-SIGN MATERIALS

- A. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated and suitable for exterior applications.
- B. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.05 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
 - 1. Use concealed fasteners and anchors unless indicated to be exposed.
 - 2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
 - 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - b. Fastener Heads: For nonstructural connections, use screws and bolts with tamper-resistant spanner-head slots unless otherwise indicated.
 - 4. Sign Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
 - 5. Inserts: Furnish inserts to be set by other trades into concrete or masonry work.
- B. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

2.06 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 - 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 - 3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 - 4. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
- B. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.

2.07 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Room Identification Signs and Other Accessible Signage: Install in locations on walls as indicated and according to ADAAG accessibility standards.
- C. Mounting Methods:
 - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
 - 2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.

- b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.
 - 3. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
 - 4. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
- D. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.03 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

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. Public-use washroom accessories.
 - 2. Underlavatory guards.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.

1.04 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty requirements listed under this section.

1.05 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals. Manufacturer's service and parts manual shall be provided to the owner upon completion of project.
- B. All keyed toilet accessories shall be keyed alike. Six keys shall be provided to the Owner.

1.06 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts, and anchoring devices set into back-up construction as required to prevent delaying the Work.

1.07 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 5 years from date of Substantial Completion for Toilet Accessories and Hand Dryer units. Mirror reflective surfaces shall be warranted for a period of 15 years against silver spoilage.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Stainless Steel: ASTM A666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated. 65-70% post-recycled content.
- B. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 (Z180) hot-dip zinc coating.
- C. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
- D. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- E. Mirrors: ASTM C1048, Tempered Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.02 WASHROOM ACCESSORIES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Bobrick Washroom Equipment, Inc.
 - 2. American Specialties, Inc.
 - 3. Bradley Corporation
- B. Toilet Tissue (Roll) Dispensers:
 - 1. Basis-of-Design Product: Bobrick Model B-2892.
 - a. Description: Twin Jumbo-roll dispenser
 - b. Mounting: Surface mounted.
 - c. Operation: Unit shall be equipped with two theft-resistant, heavy-duty, one-piece molded ABS spindles.
 - d. Capacity: Designed for up to 10 inch- diameter tissue rolls.
 - e. Material and Finish: Type 304 Stainless steel, No. 4 finish (satin).
 - f. Lockset: Tumbler type. Keyed alike to all other Toilet Accessories.
 - g. Refill Indicator: Wide viewing slot in door.
- C. Liquid-Soap Dispensers:
 - 1. Counter mounted Top Fill Liquid Soap Dispenser: Bobrick B-824
 - a. Description: Designed for dispensing soap in liquid or lotion form. Valve shall be operable with one hand and with less than 5 pounds of force to comply with barrier-free accessibility guidelines. Unit shall have a locked, hinged stainless steel lid for top filling.
 - b. Mounting: Horizontally oriented, surface mounted. Shank handles up to a 2"
 - c. Capacity: 34 fluid oz. Translucent, shatter-resistant polyethylene Soap Bottle.
 - d. Materials: Above the counter, chrome plated ABS plastic Spout. Unit equipped with a spring-loaded 180 degree rotatable lid with concealed locking mechanism for top filling. Unit shall be type 304 Stainless Steel and shall have concealed, vandal-resistant mounting.
 - e. Bottom Housing: Water-resistant, ABS plastic housing attached to the bottom of the Bottle houses the PC B, motor that drives the gear pump Housing. Housing includes a Portion Control Knob, Flush Button to allow for system cleaning and maintenance, a connector for the Fiber Optic cables and Power Port.
 - f. Electronic Activation / Indication System: Pair of Plastic Fiber Optic cables connect the plastic Activation Lenses to an IR Sensor located on a PC Board in the Bottom Housing. A third plastic Fiber Optic Cable connects an LED located on the PC Board

to an Acrylic Lens at the tip of the spout; a solid green LED indicates dispense activity and a red blinking LED light indicates low battery life. All three cables are integrated into one Fiber Optic connector Tip for ease of installation.

- g. Battery Pack: Water-resistant, plastic material holds 4 Alkaline "D" cell batteries (contractor to provide). ANSI-134A, IEC LR20 Designation.

D. Grab Bars:

- 1. Basis-of-Design Product: Bobrick Model B-6806-Series.
 - a. Mounting: Flanges with concealed vandal resistant fasteners.
 - b. Material: Stainless steel, 0.05 inch thick.
 - c. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant, satin-finish texture in grip area.
 - d. Outside Diameter: 1-1/2 inches (38 mm).
 - e. Configurations and Lengths: As indicated on Drawings. Concealed mounting flanges shall be 1/8" thick stainless steel plate, 2" x 3-1/8", and equipped with two screw holes for attachment to wall. Flange covers shall be 22 gauge, 3-1/4" diameter x 1/2" deep, and shall snap over mounting flange to conceal mounting screws and/or wingtip fasteners. Ends of grab bar shall pass through concealed mounting flanges and be heliarc welded to form one structural unit. Clearance between the grab bar and wall shall be 1-1/2".
 - f. Grab bars shall comply with barrier-free accessibility guidelines (including ADAAG and ICC 117.1.) for structural strength and configurations.

E. Napkin / Tampon Vendor:

- 1. Basis-of-Design Product: Bobrick Model No. B-47069 25
- 2. Type: Sanitary napkin and tampon.
- 3. Mounting: Surface mounted.
- 4. Capacity: Holds 30 Tampons, 20 Napkins.
- 5. Operation: Two coin (50 cents).
- 6. Exposed Material and Finish: Type 304, 18-8 Stainless steel, No. 4 finish (satin).
- 7. Lockset: Two flush Tumbler type door locks keyed alike with separate lock and key for coin box management access.

F. Sanitary-Napkin Disposal Units:

- 1. Basis-of-Design Product: Bobrick Model B-270.
 - a. Mounting: Surface mounted.
 - b. Door or Cover: Drawn, one-piece construction secured with a continuous piano hinge.
 - c. Receptacle: 1.0 gallon capacity.
 - d. Material and Finish: Stainless steel, No. 4 finish (satin).

G. Toilet Seat Cover Dispenser:

- 1. Basis-of-Design Product: Bobrick Model B-4221.
- 2. Mounting: Surface mounted.
- 3. Capacity: 250 single or half-fold paper toilet seat covers
- 4. Exposed Material and Finish: 18-8. Type 304, Stainless steel, 20 Ga. No. 4 finish (satin).

H. Mirror Units:

- 1. Basis-of-Design Product: Bobrick Model B-2908 2436-Series
 - a. Frame: Type 304 Stainless-steel angle, 0.05 inch (1.3 mm) thick .Mirror shall have a one-piece, type-304 stainless steel angle frame, 3/4" x 3/4" (19 x 19mm) with continuous integral stiffener on all sides and beveled front to hold frame tightly against mirror. All exposed surfaces shall have satin finish with vertical grain
 - 1) Corners: Heliarc Welded and ground smooth.

- b. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - 1) One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - 2) Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
- c. Size: As indicated on Drawings. Provide 24" wide x 36" long units with mounting height to reflective surface at 40" above finish floor for ADA accessible lavatories.
- d. All mirror edges shall be protected by plastic filler strips and the back shall be protected by full-size, shock-absorbing, water-resistant, nonabrasive, 3/16" (5mm) thick polyethylene padding.
- e. Mirror: 1/4" tempered glass mirror with galvanized steel back.

2.03 WARM-AIR DRYERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Dyson
 - 2. World Dryer.
 - 3. Or approved equal.
- B. Air Blade Hand Dryers:
 - 1. Dyson airblade V, Model AB12 Sprayed Nickel, 1400 W, digital motor - V4 brushless DC 92,000 rpm motor, voltage as indicated on the drawings; Low voltage = 11.7 amps; High voltage = 7.3 amps; double life HEPA filter 99.97% at 0.3 micron bacteria removal; Touch-free proximity capacitive sensor; Airspeed at aperture: 420 mph; Operation Lock-out period: 30 seconds; Rated operating sound pressure: 85 db(A).
 - a. Mount dryer at a height to comply with ADA requirements for operation.
 - b. Cover Material: Polycarbonate ABS casing
 - c. Finish: Sprayed Nickel
 - d. Antimicrobial type: Sprayed Nickel - Additive in paint
 - e. Warranty: 5 year parts and 5 year limited labor warranty

2.04 UNDERLAVATORY GUARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Truebro by IPS Corporation.
 - 2. Or approved equal.
- B. Underlavatory Guards:
 - 1. Basis-of-Design Product: TrueBro Lav-Shield.
 - a. Description: Durable single piece enclosure conceals piping and valves under the lavatory, preventing direct contact with and burns from piping. Removable to allow service access.
 - b. Material and Finish: Antimicrobial, molded plastic, white.

2.05 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

3.02 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

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 portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: Provide Fire Extinguishers in locations as shown on the drawings and as required by the AHJ.

1.04 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.06 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.07 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire extinguishers approved, listed, and labeled by FM Global.
 - 2. UL 299 - Dry Chemical Fire Extinguisher.

2.02 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and wall-mounted bracket as indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
 - a. Amerex Corporation.
 - b. Ansul Incorporated.
 - c. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - d. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
 - e. Potter Roemer LLC.
 - 3. Valves: Nickel-plated, polished-brass body.
 - 4. Handles and Levers: Stainless steel.
 - 5. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.
 - 1. Model 3010 as manufactured by Potter-Roemer or approved equal.
- C. In Kitchen locations provide Class K type Fire extinguishers as required by the authority having jurisdiction.
 - 1. Purple-K Dry-Chemical Type in Aluminum Container : UL-rated 30-B:C, 5-lb (2.3-kg) nominal capacity, with potassium bicarbonate-based dry chemical in enameled-aluminum container.

2.03 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of 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. Amerex Corporation.
 - b. Ansul Incorporated.
 - c. JL Industries, Inc.; a division of the Activar Construction Products Group
 - d. Larsen's Manufacturing Company.
 - e. Potter Roemer LLC.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.
 - b. Signage shall comply with the requirements of the authority having jurisdiction.
 - c. Signs shall be provided at each fire extinguisher location and shall be as follows:

- 1) Enamel-coated Aluminum sign, 24" height by 5" wide, Triangle in shape and multi-angle viewable, Red background with white graphics reading "Fire Extinguisher". Sign shall be suitable for interior and exterior use.
- 2) Signs shall be UV, chemical, abrasion and moisture resistant.
- 3) Model No. NHE-7497 Tri as manufactured by Compliance Signs 1-800-578-1245; Allstate Sign & Plaque 1-800-240-6039 or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install fire extinguishers, fire extinguisher cabinets and mounting brackets and compliance signage in locations indicated and in compliance with requirements of authorities having jurisdiction.
 1. Wall Mounted Fire Extinguishers: Mount Extinguishers as indicated on the drawings.
 2. Cabinet Mounted Fire extinguishers: Mount cabinets as indicated on the drawings. Note: cabinet mounting height shall provide a maximum height of 42" to the top of the extinguisher handle.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated. Provide solid blocking in wall behind as required for anchorage of brackets and cabinets.

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. Electrically operated, front-projection screens and controls.
 - 2. Front projection screen controls

1.03 RELATED REQUIREMENTS:

- A. Division 26 - Electrical for Screen motor operation.

1.04 DEFINITIONS

- A. Gain: Ratio of light reflected from screen material to that reflected perpendicularly from a magnesium carbonate surface as determined per SMPTE RP 94.
- B. Half-Gain Angle: The angle, measured from the axis of the screen surface to the most central position on a perpendicular plane through the horizontal centerline of the screen where the gain is half of the peak gain.

1.05 ACTION SUBMITTALS

- A. Submit under the provisions of Section 013300 - SUBMITTALS.
- B. Product Data: For each type of product.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Show layouts and types of front-projection screens. Include the following:
 - 1. Drop lengths.
 - 2. Location of screen centerline relative to ends of screen case.
 - 3. Anchorage details, including connection to supporting structure for suspended units.
 - 4. Details of juncture of exposed surfaces with adjacent finishes.
 - 5. Location of wiring connections for electrically operated units.
 - 6. Wiring diagrams for electrically operated units.
 - 7. Accessories.
- D. Samples for Initial Selection: For finishes of screen closure panels and all exposed portions of the screen installation.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For front-projection screens to include in maintenance manuals.

1.07 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain each type of projection screen required from a single manufacturer as a complete unit, including necessary mounting hardware and accessories.

- B. Coordination of Work: Coordinate layout and installation of projection screens with other construction supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system, and partitions.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Environmental Limitations: Do not deliver or install front-projection screens until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Protect screens from damage during delivery, handling, storage, and installation.

1.09 COORDINATION

- A. Coordinate layout and installation of front-projection screens with adjacent construction, including ceiling suspension systems, light fixtures, HVAC equipment, fire-suppression system, and partitions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Draper®, Inc., which is located at: 411 S. Pearl P. O. Box 425; Spiceland, IN 47385-0425. ASD. Toll Free Tel: 800-238-7999; Tel: 765-987-7999; Fax: 866-637-5611; Web: www.draperinc.com. Obtain accessories, including necessary mounting hardware, from screen manufacturer.
- B. Requests for substitutions will be considered in accordance with provisions of Section 012500 - PRODUCT SUBSTITUTION PROCEDURES.

2.02 MOTORIZED, CEILING RECESSED, FRONT PROJECTION SCREENS

- A. Ultimate Access XL E: Electric motor operated, metal case, independently motorized closure. Ceiling-recessed, metal headbox, 14-11/16 inches (373 mm) high by 11 inches (279 mm) deep. UL approved "Suitable for use in environmental air space." Case finished white. Bottom of case consists of an independently motorized trap door that opens up inside the screen case. Trap door and access door both hinge downward to allow access to inside of screen case. Doors remain attached to the screen case via a concealed full-length hinge. Releasing one latch at each end of screen case allows doors to hinge downward and a prop arm at each end may be pivoted to engage with endcaps, keeping the door assembly in its fully open position. Symmetrical case allows for viewing surface to unroll from the back or front of the roller. Screen is attached to roller with roller brackets. Metal roller mounted on rubber isolation mounts.
 - 1. Motor mounted inside screen roller on rubber isolation insulators. Motor UL certified, rated 110-120V AC, 60 Hz, five wire, instantly reversible, lifetime lubricated with pre-set accessible limit switches. Motor with overload protection and electric brake. Motor shall be left mounted.
 - 2. Quiet Motor mounted inside screen roller on rubber isolation insulators. Motor operates at 44db and is UL certified, rated 110-120V AC, 60 Hz, five wire, instantly reversible, lifetime lubricated with pre-set accessible limit switches. Motor with overload protection and electric brake. Motor shall be left mounted.
- B. Projection Viewing Surface:

1. Matt White XT1000E - On Axis gain of 1.0. 180 degree viewing cone. Washable surface. GREENGUARD Gold certified. 4K ready.
2. Argent White XH1500E - On Axis gain of 1.5. High reflectivity fabric with broad viewing cone. Excellent resolution and color balance. Flame and Mildew resistant. Maximum size 8 feet by 10 feet (244 cm x 305 cm). 4K ready.
3. Pearl White CH1900E - On Axis gain of 1.9. Matt white surface with reflective pearlescent coating. Maximum size 96 inches by 96 inches (244 cm x 244 cm). 4K ready.
4. Contrast White XH1100E - On Axis gain of 1.1. Diffuse white coating over a grey base material. Recommended for use with low to moderate light output digital projectors, where some provision for light control exists. Maximum size 8 feet by 10 feet (244 cm x 305 cm). 4K ready.
5. Contrast Grey XH800E - 0.8 On Axis gain. Smooth grey surface provides excellent resolution and enhances color contrast. 180 degree viewing cone. GREENGUARD Gold certified. 4K ready.
6. ClearSound White Weave XT900E - On Axis gain of 0.9. 180 degree viewing cone. Acoustically transparent woven blend of fiberglass and PVC. Acoustical properties are comparable to the highest quality speaker grille cloth. Some control of ambient light is recommended. Flame and mildew resistant. Not recommended for use in sizes less than 80 inches (203 cm) wide. Not recommended for viewing less than 10 feet (305 cm) from screen. 4K ready.
7. ClearSound Grey Weave XH600E - On Axis gain of 0.6. 180 degree viewing cone. Acoustically transparent woven blend of fiberglass and PVC. Grey material for higher contrast. Acoustical properties are comparable to the highest quality speaker grille cloth. Flame and mildew resistant. Not recommended for use in sizes less than 80 inches (203 cm) wide. Not recommended for viewing less than 10 feet (305 cm) from screen. 4K ready.
8. Chroma Key Green - Green flexible PVC surface for video production where you need the background to "disappear." Matte finish. Flame retardant, tear resistant, and wrinkle resistant. Offers excellent uniformity and consistent surface color edge to edge. Works effectively throughout 180 degree viewable range.
9. Viewing Area (H x W)
 - a. NTSC Format (4:3). Black masking borders and 12 inches (305 mm) extra black drop are standard.
 - 1) 200 inch (5.08 m) diagonal, 118 inches x 158 inches (2997 mm x 4013 mm).
 - 2) 210 inch (5.33 m) diagonal, 126 inches x 168 inches (3200 mm x 4267 mm).
 - 3) 220 inch (5.59 m) diagonal, 132 inches x 176 inches (3353 mm x 4470 mm).
 - 4) 230 inch (5.84 m) diagonal, 138 inches x 184 inches (3505 mm x 4674 mm).
 - 5) 240 inch (6.10 m) diagonal, 141 inches x 188 inches (3581 mm x 4775 mm).
 - 6) 250 inch (6.35 m) diagonal, 148 inches x 198 inches (3759 mm x 5029 mm).
 - 7) 270 inch (6.86 m) diagonal, 162 inches x 216 inches (411 x 549 cm).
 - 8) 295 inch (7.62 m) diagonal, 177 inches x 236 inches (4496 mm x 5994 mm).
 - 9) 27-1/2 foot (8.38 m) diagonal, 194 inches x 260 inches (4928 mm x 6604 mm).
 - b. HDTV Format (16:9). Black masking borders and 12 inches (305 mm) extra black drop are standard.
 - 1) 184 inches (4.67 m) diagonal, 90 x 160 inches (2286 mm x 4064 mm).
 - 2) 193 inches (4.90 m) diagonal, 94-1/2 inches x 168 inches (2400 mm x 4267 mm).
 - 3) 220 inches (5.59 m) diagonal, 106 inches x 188 inches (2692 mm x 4775 mm).
 - 4) 248 inches (6.30 m) diagonal, 121 1/2 inches x 216 inches (309 cm x 549 cm).
 - 5) 270 inch (6.858 mm) diagonal, 133 inch by 236 inches (3378 mm by 5994 mm).
 - 6) 300 inch (7620 mm) diagonal, 146 inches x 260 inches (3708 mm x 6604 mm).
 - c. 16:10 Format. Black masking borders standard.
 - 1) 189 inch (4800 mm) diagonal, 100 inches x 160 inches (2540 mm x 4064 mm).
 - 2) 198 inch (5029 mm) diagonal, 105 inches x 168 inches (2667 mm x 4267 mm).

- 3) 222 inch (5638 mm) diagonal, 117-1/2 inches x 188 inches (2985 mm x 4775 mm).
- 4) 255 inches (648 cm) diagonal, 135 inches x 216 inches (343 cm x 549 cm).
- 5) 278 inch diagonal (7061 mm), 147-1/2 inches x 236 inches (3747 mm x 5994 mm).
- 6) 307 inch (7798 mm) diagonal, 162-1/2 inches x 260 inches (4128 mm x 6604 mm).

2.03 FRONT PROJECTION SCREEN CONTROLS

- A. General: All controls are UL Certified.
 1. Single station control rated 115V AC, 60 Hz with 3-position rocker switch with cover plate to stop or reverse screen at any point.
 2. Multiple station control rated 115V AC, 60 Hz with 3-position rocker switches with cover plates to stop or reverse screen at any point. Automatic override allows only one signal to reach the motor when operated simultaneously.
 3. Low voltage control unit with three button 24V switches and cover plate to stop or reverse screen at any point, built-in RF receiver, built-in Video Interface Control trigger for 3V-28V, RS232, and dry contact relays.
 4. Low voltage 24V control unit with hand held RF remote three button control switch to stop or reverse screen at any point, built-in RF receiver, built-in Video Interface Control trigger for 3V-28V, RS232, and dry contact relays.
 5. Low voltage 24V control unit with hand held IR remote three button control switch to stop or reverse screen at any point, built-in RF receiver, built-in Video Interface Control trigger for 3V-28V, RS232, and dry contact relays.
 6. Key Operated power supply switch to control power to control system.
 7. Locking switch cover plate for limited access to three position switch.
 8. Key operated 3-position control switch rated 115V AC, 60 Hz to stop or reverse screen at any point.
 9. 3-position low voltage control switch with key locking cover plate rated 24V to stop or reverse screen at any point.
 10. Motor shall be Right mounted.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify rough-in openings are properly prepared.
- 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. 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 front-projection screens at locations indicated to comply with screen manufacturer's written instructions.

- B. Install front-projection screens with screen cases in position and in relation to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.
 - 1. Install low-voltage controls according to NFPA 70 and complying with manufacturer's written instructions.
 - a. Wiring Method: Install wiring in raceway except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.
- C. Test electrically operated units to verify that screen controls, limit switches, closures, and other operating components are in optimum functioning condition.

3.04 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

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 stage pipe rigging and rigging accessories.

1.03 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for pipe rigging. Include plans, elevations, sections, details, anchoring and mounting requirements, attachments to other work, and the following:
 - 1. Locations of equipment components, switches, and controls. Differentiate between manufacturer-installed and field-installed components.
 - 2. Shop drawings shall be signed and sealed by NYS Licensed Professional Engineer. Responsibility shall include all elements related to overhead lifting, support of elements provided by the stage rigging contractor, and all overhead suspended elements.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of theater stage rigging.

1.05 REFERENCES

- A. Individuals, organizations and companies involved in the design and construction of manually powered counterweight rigging systems shall comply with the rules and recommendations of the following standard ANSI E1.4 - 2014, Entertainment Technology - Manual Counterweight Rigging Systems.
- B. Individuals, organizations and companies involved in the design, manufacture and/or installation of boom and base assemblies, simple ground-support devices for lighting equipment and accessories shall comply with the rules and regulations of the following standard. ANSI E1.15 - 2006, Entertainment Technology-- Recommended Practices and Guidelines for the Assembly and Use of Theatrical Boom & Base Assemblies.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings and construction contiguous with stage pipe rigging by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.01 STAGE AND LIGHTING RIGGING

- A. Pipe Battens:
 - 1. Pipe Battens shall be constructed from 1.5" id schedule 40 steel pipe. Lengths greater than 20' shall be formed by means of an internal sleeve not less than 2' long with a ¼" or greater wall thickness and no more than 1/16" play. Internal sleeve will be fixed in place by means of (4) 3/8" G5 bolts and nylock nuts.
 - 2. Batten for weight pipes shall be ¾" id schedule 40 steel pipe. Lengths shall be 10'. Splices shall be formed by threaded conduit coupling with smooth exterior.

3. All burrs and sharp edges are to be removed.
 4. For each 1.5" batten supply model #680 batten clamps with a 1400 lbs WLL. Supply not less than (1) clamp for every 10' of batten length, or portion there of, plus (1) clamp.
 5. Battens shall have a textured matte black powder coat finish.
 6. A minimum of 100 mm (4 inches) at each end of the batten shall be marked with an approved OSHA color, except in architecturally sensitive areas.
 7. The batten shall be capable of supporting at minimum 45 Kg/m (30 lbs/ft) of uniformly distributed load. Battens shall be capable of sustaining a point load of 45 Kg (100 pounds) at mid-span between any two lift lines with a maximum span deflection of 1/180 of the span.
- B. Pipe Batten Hardware:
1. With regard to load bearing components, except for wire rope all products shall be manufactured and distributed by entities within the United States. Components shall be load rated and documentation of such shall be freely and publicly available from the manufacturer. Each component must bear a durable manufacturer's mark and must be clearly identifiable by make and model without ambiguity.
 2. Shackles:
 3. Shackles shall be domestically produced, load rated, screw pin anchor shackles, drop forged and galvanized.
 4. After final adjustment, mouse shackles to prevent loosening.
 5. Turnbuckles:
 6. Fabricate from forged and galvanized steel conforming to ASTM F1145, Type 1, Grade 1.
 7. After final adjustment, mouse turnbuckles with wire to prevent loosening.
 8. Pipe Clamps:
 9. Two-piece construction fabricated from two (2) strips of 7-gage by 2-inch hot rolled steel formed to encompass and clamp pipe batten to prevent rotation. Round corners to prevent snapping on adjacent curtains.
 10. Provide a 3/8-inch Grade 5 hex bolt, lock washer, and hex nut above and below batten.
 11. A 17/32-inch hole at top of clamp shall allow for attachment of rigging hardware.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for supporting members, blocking, installation tolerances, clearances, and other conditions affecting performance of stage-curtain work. Examine inserts, clips, blocking, or other supports required to be installed by others to support tracks and battens.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Field Measurements: Verify actual dimensions of openings and construction contiguous with theater and stage equipment by field measurements before fabrication begins. Indicate measurements on shop drawings for coordination.
- D. The Theatrical Contractor shall be responsible for having personnel available to accept delivery of all equipment and for providing the necessary labor, fork lifts, cranes, derricks, dollies, ramps, and tools to unload & place the equipment.

3.02 INSTALLATION, GENERAL

- A. Install stage rigging system per manufacturer and fabricator's written instructions and approved shop drawings.

- B. Installer Qualifications: A Company with a minimum of five (5) years' experience installing similar rigging projects.
- C. Installation shall be performed with an Installation Supervisor that is ETCP certified in Theatrical Rigging. The Installation Supervisor must be present and actively engaged in operations at all times work is being performed.
- D. The Installation Crew is to be under the direct supervision of the Installation Supervisor and experienced in installation of similar rigging systems. For purposes of this requirement "experienced" shall mean no more than 1 in 4 members of the Installation Crew shall have less than 160 documented hours experience installing similar rigging equipment in an entertainment environment.
- E. Under no circumstances shall any product be installed in a manner inconsistent with the manufacturers design intent.
- F. Preparation: Stage Rigging Contractor is responsible for becoming familiar with and verifying pertinent dimensions and conditions, both on Drawings and in the Field, before proceeding with the Work.
- G. Protect stage floor from both structural and cosmetic damage.

3.03 DEMONSTRATION AND CLOSEOUT SUBMITTALS

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain stage rigging.
- B. Operation and Maintenance Data: Provide three (3) sets of data including parts list for rigging and each piece of equipment provided or installed to include in the operation and maintenance manuals.
- C. Record Drawings: Provide three (3) sets of "as-built" shop drawings.

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 stage curtains, draw-curtain tracks, and rigging accessories.

1.03 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for stage curtains. Include plans, elevations, sections, details, attachments to other work, and the following:
 - 1. Locations of equipment components, switches, and controls. Differentiate between manufacturer-installed and field-installed wiring.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of stage curtains.
- B. Fire-Test-Response Characteristics: Provide stage curtains with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flame-Resistance Ratings: Passes NFPA 701.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings and construction contiguous with stage curtains and rigging by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.01 CURTAIN FABRICATION

- A. General: Affix permanent label, stating compliance with requirements of authorities having jurisdiction, in accessible location on curtain not visible to audience. Provide vertical seams unless otherwise indicated. Arrange vertical seams so they do not fall on faces of pleats. Do not use fabric cuts less than one-half width.
 - 1. Vertical Hems: Provide vertical hems not less than 2 inches (50 mm) wide, and not less than 4 inches (102 mm) wide at borders, valance, teasers, and tormentors, with not less than a 1-inch (25-mm) tuck, and machine sew with no selvage material visible from front of curtain. Sew open ends of hems closed.
 - 2. Leading Edge Turnbacks: Provide Turnbacks formed by folding back not less than 12 inches (300 mm) of face fabric, with not less than a 1-inch (25-mm) tuck, and secure by sewing turnbacks vertically.
 - 3. Top Hems: Reinforce top hems by double-stitching 3-1/2-inch- (89-mm-) wide, heavy jute webbing to top edge on back side of curtain with not less than 2 inches (50 mm) of face fabric turned under.
 - 4. Flat: Provide zero percent fullness in curtains.

5. Pleats: Provide 100 percent fullness in curtains, exclusive of Turnbacks and hems, by sewing additional material into 6-inch (150-mm) double-stitched box pleats sewn flat and spaced at 12 inches (300 mm) o.c. along top hem reinforcement.
 6. Grommets: Brass, No. 3 or No. 4.
 - a. Black Curtains: Provide brass or aluminum grommets with black finish.
 - b. Flat Curtains: Place 12 inches (300-mm) o.c. and 1 inch (25 mm) from corner of curtain; for ties, snap hooks, or S-hooks.
 - c. Flat Curtains: Provide blind grommet top finish to mask battens using hidden pairs of grommets; place 12 inches (300-mm) o.c. and 1 inch (25 mm) from corner of curtain; for ties.
 - d. Pleated Curtains: Centered on each box pleat and 1 inch (25 mm) from corner of curtain; for snap hooks or S-hooks.
 7. Bottom Hems: For flat curtains without fullness.
 - a. Provide a 4-inch (100-mm) lined hem with a pocket that allows the sliding of a pipe or conduit stiffener into the bottom of the curtain, and provide a concealing flap of same fabric in front of pocket and made 2 inches (50 mm) longer than the bottom edge of the pocket.
 8. Bottom Hems: For curtains with fullness.
 - a. For floor-length curtains, provide hems not less than 6 inches (150 mm) deep with manufacturer's standard series of individual weights in individual closed pockets sewn above the finished bottom edge of curtain. Sew open ends of hems closed.
 9. Lining: Provide lining for each curtain in same fullness as face fabric and finished 2 inches (50 mm) shorter than face fabric. Sew or otherwise securely attach lining to top hem of face fabric. Attach lining to face fabric along bottom and side seams with 4-inch- (100-mm-) long strips of heavy woven cotton tape. Sew lining to bottom edge of curtain allowing sufficient lining fabric for tucking to prevent shrinkage.
- B. Drop: Fabricate from muslin fabric, sewn flat, with either horizontal or vertical seams to suit Project and selvage to the rear. Provide 6-inch (150-mm) pipe pocket at bottom with a 6-inch (150-mm) flap of same fabric in front of pocket. Provide double-stitched, 3-1/2-inch (89-mm) jute webbing at top with not less than No. 2 brass grommets spaced at 12 inches (300 mm) o.c. and 1 inch (25 mm) from corner of curtain. Provide not less than a 2-inch (50-mm) double-folded side hem and a 4-inch (100-mm) bottom hem.
- C. S-Hooks: Track Manufacturer's standard heavy-duty plated-wire hooks, not less than 2 inches (50 mm) long.
- D. Tie Lines: No. 4 or No. 4-1/2 cord or braided soft cotton tape, black or white to best match curtain; not less than 5/8 inch (16 mm) wide by 36 inches (900 mm) long, threaded through grommets.
- E. Snap Hooks: Track manufacturer's standard heavy-duty hooks, sewn to top edge of curtain.

2.02 ALUMINUM-CURTAIN TRACK

- A. Motorized Operation: Fabricate curtain track with cord, pulleys, and floor block.
1. End Pulleys: One single dead-end and one double live-end pulley. Provide sheave(s) with shielded ball bearing(s), housed in plated-steel body finished to match track. Provide with bracket for securing off-stage curtain end.
 2. Floor Block: Sheave with shielded ball bearing housed in plated-steel body finish painted black. Adjustable, with detachable base plate.

2.03 STEEL-CURTAIN TRACK

- A. Steel Track: Fabricate of roll-formed, galvanized, commercial-quality, zinc-coated steel sheet; complying with ASTM A 653/A 653M; G60 (Z180) coating designation with continuous bottom slot and with each half of track in one continuous piece; black paint finish.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Thickness: 0.064 inch (1.63 mm).
- B. Suspended Track: NPS 1-1/2 (DN 40) steel pipe stiffener for supporting both sections of suspended curved tracks.
- C. Clamp and Bracket Hangers: Manufacturer's steel clamps and brackets of sufficient strength required to support loads for attaching track to overhead support.
- D. Track Lap Clamp: Metal to match track channel for attaching double-sectioned track at center overlap.
- E. Fold Guide: Equip carriers with rear-fold or backpack guide and rubber spacers to permit offstage curtain folding; sized for use with operating line if any.
- F. Heavy-Duty Track System: Equip track with heavy-duty components. Provide end stops for track.
 - 1. Curtain Carriers: Standard carriers of plated steel with a pair of nylon-tired ball-bearing wheels riveted parallel to body. Equip carriers with rubber or neoprene bumpers to reduce noise, and heavy-duty, plated-steel swivel eye and manufacturer's standard trim chain for attaching curtain snap or S-hook. Provide quantity of curtain carriers sufficient for track length, to suit curtain fabrication.
 - a. Master Curtain Carriers: One master carrier, for each leading curtain edge, of plated steel with two pairs of nylon-tired ball-bearing wheels and with two line guides per carrier.
 - 2. End Pulleys and Floor Block: One dead-end, single-wheel pulley; one live-end, double-wheel pulley; and one adjustable, floor block; each with not less than 5-inch (125-mm) molded-nylon- or glass-filled-nylon-tired ball-bearing sheaves enclosed in steel housings. Provide pulleys with steel housing finished to match track and with bracket for securing off-stage curtain end. Provide an adjustable floor block to maintain proper tension on operating line with steel housing painted black.
- G. Motorized Operation: Provide with cable operating line consisting of manufacturer's standard 3/16-inch- (4.7-mm-) diameter, stretch-resistant operating cable consisting of braided synthetic-fiber jacket over galvanized wire cable.

2.04 DRAW-CURTAIN MACHINE

- A. General: Provide operating machine of size and capacity recommended and provided by track manufacturer for curtain specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, and remote controls. Coordinate wiring requirements and electrical characteristics with building electrical system.
- B. Operator Type: Traction drive.
- C. Motor Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds within installed environment and with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1 and the following:

1. Voltage: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.
 2. Horsepower: Insert value.
 3. Enclosure: Open dripproof.
 4. Duty: Continuous duty at ambient temperature of 105 deg F (40 deg C) and at altitude of 3300 feet (1005 m) above sea level.
 5. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
 6. Phase: Polyphase.
- D. Remote-Control Station: Provide momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
1. Provide key-operated switches, keyed alike, with one key per switch plus one extra key.
 2. Provide key-accessed control enclosures, keyed alike, with one key per switch plus one extra key.
- E. Limit Switches: Fully closed and fully opened preset stops.

2.05 CURTAIN RIGGING

- A. Supports, Clamps, and Anchors: Sheet steel in manufacturer's standard thicknesses, galvanized after fabrication according to ASTM A153/A153M, Class B.
- B. Trim and Support Cable: 1/4-inch (6-mm) diameter, 7x19 galvanized-steel cable with a breaking strength of 7000 lb (3175 kg). Provide fittings complying with cable manufacturer's written recommendations for size, number, and method of installation, including a drop-forged galvanized turnbuckle to allow for leveling.
- C. Trim and Support Chain: Grade 80 hardened alloy steel chain rated for overhead lifting, ASTM A391/A391M.
- D. Inserts, Bolts, Rivets, and Fasteners: Manufacturer's standard corrosion-resistant units.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for supporting members, blocking, installation tolerances, clearances, and other conditions affecting performance of stage-curtain work. Examine inserts, clips, blocking, or other supports required to be installed by others to support tracks and battens.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. Install stage-curtain system according to track manufacturer's and curtain fabricator's written instructions.

3.03 TRACK INSTALLATION

- A. Ceiling-Mounted Tracks: Drill track at intervals not greater than manufacturer's written instructions for spacing, and fasten directly to structure.
- B. Spacing: Do not exceed the following dimensions between supports:
1. Heavy-Duty Track: 72 inches (1829 mm).

- C. Install track for center-parting curtains with not less than 24-inch (600-mm) overlap of track sections at center, supported by special lap clamps.

3.04 CURTAIN INSTALLATION

- A. Track Hung: Secure curtains to track carriers with S-hooks snap hooks.
- B. Batten Hung: Secure curtains to pipe battens with S-hooks ties.

3.05 DRAW-CURTAIN-MACHINE INSTALLATION

- A. Install draw-curtain machines by securely mounting to floor wall construction, according to manufacturer's written instructions.

3.06 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain stage curtains, draw-curtain machines, and tracks.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flexible pipe connectors.
- B. Expansion joints and compensators.
- C. Pipe loops, offsets, and swing joints.

1.02 RELATED REQUIREMENTS

- A. Section 221005 - Plumbing Piping.

1.03 REFERENCE STANDARDS

- A. EJMA (STDS) - EJMA Standards; Tenth Edition.
- B. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
 - 2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- C. Manufacturer's Instructions: Indicate manufacturer's installation instructions, special procedures, and external controls.
- D. Maintenance Data: Include adjustment instructions.
- E. Project Record Documents: Record installed locations of flexible pipe connectors, expansion joints, anchors, and guides.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Comply with UL (DIR) requirements.

2.02 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metralflex.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Inner Hose: Carbon steel.
- C. Exterior Sleeve: Single braided, stainless steel.

- D. Pressure Rating: 125 psi and 450 degrees F.
- E. Joint: Flanged.
- F. Size: Use pipe sized units.
- G. Maximum offset: 3/4 inch on each side of installed center line.

2.03 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Inner Hose: Bronze.
- C. Exterior Sleeve: Braided bronze.
- D. Pressure Rating: 125 psi and 450 degrees F.
- E. Joint: Flanged.
- F. Size: Use pipe sized units.
- G. Maximum offset: 3/4 inch on each side of installed center line.
- H. Application: Copper piping.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.
- C. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.
- D. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
- E. Anchor pipe to building structure where indicated. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- F. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.
- G. Substitute grooved piping for vibration isolated equipment instead of flexible connectors. Grooved piping need not be anchored.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flexible pipe connectors.
- B. Expansion joints and compensators.
- C. Pipe loops, offsets, and swing joints.

1.02 RELATED REQUIREMENTS

- A. Section 221005 - Plumbing Piping.

1.03 REFERENCE STANDARDS

- A. EJMA (STDS) - EJMA Standards; Tenth Edition.
- B. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
 - 2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- C. Manufacturer's Instructions: Indicate manufacturer's installation instructions, special procedures, and external controls.
- D. Maintenance Data: Include adjustment instructions.
- E. Project Record Documents: Record installed locations of flexible pipe connectors, expansion joints, anchors, and guides.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Comply with UL (DIR) requirements.

2.02 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Inner Hose: Carbon steel.
- C. Exterior Sleeve: Single braided, stainless steel.

- D. Pressure Rating: 125 psi and 450 degrees F.
- E. Joint: Flanged.
- F. Size: Use pipe sized units.
- G. Maximum offset: 3/4 inch on each side of installed center line.

2.03 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Inner Hose: Bronze.
- C. Exterior Sleeve: Braided bronze.
- D. Pressure Rating: 125 psi and 450 degrees F.
- E. Joint: Flanged.
- F. Size: Use pipe sized units.
- G. Maximum offset: 3/4 inch on each side of installed center line.
- H. Application: Copper piping.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.
- C. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.
- D. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
- E. Anchor pipe to building structure where indicated. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- F. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.
- G. Substitute grooved piping for vibration isolated equipment instead of flexible connectors. Grooved piping need not be anchored.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves.

1.02 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 220523 - General-Duty Valves for Plumbing Piping.
- C. Section 220553 - Identification for Plumbing Piping and Equipment: Piping identification.
- D. Section 220719 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

- A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2016.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified this section.
 - 1. Minimum three years experience.
 - 2. Approved by manufacturer.
- C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

- A. Manufacturers:
 - 1. Flexicraft Industries; Pipe Wall Sleeve: www.flexicraft.com/#sle.
 - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Vertical Piping:
 - 1. Sleeve Length: 1 inch above finished floor.
 - 2. Provide sealant for watertight joint.
 - 3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
 - 4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.
- C. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
- D. Pipe Passing Through Below Grade Exterior Walls:
 - 1. Zinc coated or cast iron pipe.
 - 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
- E. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 - 2. Connect sleeve with floor plate except in mechanical rooms.
- F. Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 - 2. Connect sleeve with floor plate except in mechanical rooms.
- G. Penetrations in concrete beam flanges are permitted but are prohibited through ribs or beams without prior approval from the Architect/Engineer.
- H. Clearances:
 - 1. Provide allowance for insulated piping.
 - 2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
 - 3. All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- E. Structural Considerations:
 - 1. Do not penetrate building structural members unless indicated.
- F. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 - 1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
 - 2. Aboveground Piping:
 - a. Pack solid using mineral fiber complying with ASTM C592.
 - b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
 - 3. All Rated Openings: Caulk tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
 - 4. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.
- G. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves.

1.02 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 220523 - General-Duty Valves for Plumbing Piping.
- C. Section 220553 - Identification for Plumbing Piping and Equipment: Piping identification.
- D. Section 220719 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

- A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2016.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified this section.
 - 1. Minimum three years experience.
 - 2. Approved by manufacturer.
- C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

- A. Manufacturers:
 - 1. Flexicraft Industries; Pipe Wall Sleeve: www.flexicraft.com/#sle.
 - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Vertical Piping:
 - 1. Sleeve Length: 1 inch above finished floor.
 - 2. Provide sealant for watertight joint.
 - 3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
 - 4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.
- C. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
- D. Pipe Passing Through Below Grade Exterior Walls:
 - 1. Zinc coated or cast iron pipe.
 - 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
- E. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 - 2. Connect sleeve with floor plate except in mechanical rooms.
- F. Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 - 2. Connect sleeve with floor plate except in mechanical rooms.
- G. Penetrations in concrete beam flanges are permitted but are prohibited through ribs or beams without prior approval from the Architect/Engineer.
- H. Clearances:
 - 1. Provide allowance for insulated piping.
 - 2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
 - 3. All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- E. Structural Considerations:
 - 1. Do not penetrate building structural members unless indicated.
- F. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 - 1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
 - 2. Aboveground Piping:
 - a. Pack solid using mineral fiber complying with ASTM C592.
 - b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
 - 3. All Rated Openings: Caulk tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
 - 4. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.
- G. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Applications.
- B. Ball valves.
- C. Check valves.
- D. Gate valves.
- E. Plug valves.

1.02 RELATED REQUIREMENTS

- A. Section 220719 - Plumbing Piping Insulation.
- B. Section 221005 - Plumbing Piping.

1.03 ABBREVIATIONS AND ACRONYMS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Non-rising stem.
- E. OS&Y: Outside screw and yoke.
- F. PTFE: Polytetrafluoroethylene.
- G. RS: Rising stem.
- H. SWP: Steam working pressure.
- I. TFE: Tetrafluoroethylene.
- J. WOG: Water, oil, and gas.

1.04 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose (Inch); 2013 (Reaffirmed 2018).
- B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2015.
- C. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2017.
- D. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2017.
- E. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2018.
- F. ASME B16.34 - Valves - Flanged, Threaded and Welding End; 2017.

- G. ASME B31.9 - Building Services Piping; 2017.
- H. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.
- I. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2014).
- J. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017.
- K. AWWA C606 - Grooved and Shouldered Joints; 2015.
- L. MSS SP-45 - Bypass and Drain Connections; 2003 (Reaffirmed 2008).
- M. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.
- N. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.
- O. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
- P. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- Q. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.
- E. Maintenance Materials: Furnish Owner with one wrench for every five plug valves, in each size of square plug valve head.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Manufacturer:
 - 1. Obtain valves for each valve type from single manufacturer.
 - 2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Welding Materials and Procedures: Comply with ASME BPVC-IX.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.

2. Protect valve parts exposed to piped medium against rust and corrosion.
 3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
 4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
 5. Secure check valves in either the closed position or open position.
 6. Adjust butterfly valves to closed or partially closed position.
- B. Use the following precautions during storage:
1. Maintain valve end protection and protect flanges and specialties from dirt.
 - a. Provide temporary inlet and outlet caps.
 - b. Maintain caps in place until installation.
 2. Store valves in shipping containers and maintain in place until installation.
 - a. Store valves indoors in dry environment.
 - b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. See drawings for specific valve locations.
- B. Provide the following valves for the applications if not indicated on drawings:
1. Shutoff: Ball, butterfly, gate or plug.
 2. Dead-End: Single-flange butterfly (lug) type.
 3. Throttling: Provide globe, angle, ball, or butterfly.
 4. Swing Check (Pump Outlet):
 - a. 2 NPS and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
- C. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.
- D. Required Valve End Connections for Non-Wafer Types:
1. Steel Pipe:
 - a. 2 NPS and Smaller: Threaded ends.
 - b. 2-1/2 NPS to 4 NPS: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
 2. Copper Tube:
 - a. 2 NPS and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 - b. 2-1/2 NPS to 4 NPS: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
- E. Domestic, Hot and Cold Water Valves:
1. 2 NPS and Smaller:
 - a. Bronze and Brass: Provide with solder-joint ends.
 - b. Bronze Angle: Class 125, bronze disc.
 - c. Ball: One piece, full port, brass with brass trim.
 - d. Bronze Swing Check: Class 125, bronze disc.
 - e. Bronze Gate: Class 125, NRS.
 - f. Bronze Globe: Class 125, bronze disc.
 2. 2-1/2 NPS and Larger:
 - a. Iron, 2-1/2 NPS to 4 NPS: Provide with threaded ends.
 - b. Iron Ball: Class 150.

2.02 GENERAL REQUIREMENTS

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.
- C. Valves in Insulated Piping: With 2 NPS stem extensions and the following features:
 - 1. Gate Valves: Rising stem.
 - 2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - 3. Butterfly Valves: Extended neck.
- D. Valve-End Connections:
 - 1. Threaded End Valves: ASME B1.20.1.
 - 2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
 - 3. Pipe Flanges and Flanged Fittings 1/2 NPS through 24 NPS: ASME B16.5.
 - 4. Solder Joint Connections: ASME B16.18.
 - 5. Grooved End Connections: AWWA C606.
- E. General ASME Compliance:
 - 1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
 - 2. Solder-joint Connections: ASME B16.18.
 - 3. Building Services Piping Valves: ASME B31.9.
- F. Potable Water Use:
 - 1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
 - 2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.
- G. Valve Bypass and Drain Connections: MSS SP-45.

2.03 BRASS, BALL VALVES

- A. One-Piece, Reduced-Port with Brass Trim:
 - 1. Comply with MSS SP-110.
 - 2. Body: Forged brass.
 - 3. Ends: Threaded.
 - 4. Seats: PTFE.
 - 5. Stem: Brass.
 - 6. Ball: Chrome-plated brass.
 - 7. Manufacturers:
 - a. Ferguson Enterprises Inc: www.fnw.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.04 BRONZE, BALL VALVES

- A. General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. One Piece, Reduced Port with Bronze Trim:
 - 1. Comply with MSS SP-110.

2. SWP Rating: 400 psig.
3. CWP Rating: 600 psig.
4. Body: Bronze.
5. Ends: Press.
6. Seats: PTFE.
7. Stem: Bronze.
8. Ball: Chrome plated brass.
9. Manufacturers:
 - a. Viega LLC: www.viega.us/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.05 IRON, BALL VALVES

- A. Class 125, Full Port, Stainless Steel Trim:
 1. Comply with MSS SP-72.
 2. CWP Rating: 200 psig.
 3. Body: ASTM A536, Grade 65-45-12, ductile iron.
 4. Ends: Flanged.
 5. Seats: PTFE.
 6. Operator: Lever, with locking handle.
 7. Manufacturers:
 - a. Apollo Valves: www.apollovalves.com/#sle.
 - b. Ferguson Enterprises Inc: www.fnw.com/#sle.
 - c. Substitutions: See Section 016000 - Product Requirements.

2.06 BRONZE, SWING CHECK VALVES

- A. General:
 1. Fabricate from dezincification resistant material.
 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Class 125: CWP Rating: 200 psig (1380 kPa).
 1. Comply with MSS SP-80, Type 3.
 2. Design: Y-pattern, horizontal or vertical flow.
 3. Body: Bronze, ASTM B62.
 4. Ends: Threaded.
 5. Disc: Bronze.

2.07 BRONZE, GATE VALVES

- A. General:
 1. Fabricate from dezincification resistant material.
 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Rising Stem (RS):
 1. Comply with MSS SP-80, Type I.
 2. Class 125: CWP Rating: 200 psig.
 3. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
 4. Ends: Threaded or solder joint joint.
 5. Stem: Bronze.
 6. Disc: Solid wedge; bronze.
 7. Packing: Asbestos free.
 8. Handwheel: Malleable iron, bronze, or aluminum.

2.08 BRONZE, GLOBE VALVES

- A. General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Class 125: CWP Rating: 200 psig:
 - 1. Comply with MSS SP-80, Type 1.
 - 2. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
 - 3. Ends: Threaded joint.
 - 4. Stem: Bronze.
 - 5. Disc: PTFE.
 - 6. Packing: Asbestos free.
 - 7. Handwheel: Malleable Iron.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.
- B. Verify valve parts to be fully operational in all positions from closed to fully open.
- C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- C. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- D. Install check valves where necessary to maintain direction of flow as follows:
 - 1. Lift Check: Install with stem plumb and vertical.
 - 2. Swing Check: Install horizontal maintaining hinge pin level.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Applications.
- B. Ball valves.
- C. Check valves.
- D. Gate valves.
- E. Plug valves.

1.02 RELATED REQUIREMENTS

- A. Section 220719 - Plumbing Piping Insulation.
- B. Section 221005 - Plumbing Piping.

1.03 ABBREVIATIONS AND ACRONYMS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Non-rising stem.
- E. OS&Y: Outside screw and yoke.
- F. PTFE: Polytetrafluoroethylene.
- G. RS: Rising stem.
- H. SWP: Steam working pressure.
- I. TFE: Tetrafluoroethylene.
- J. WOG: Water, oil, and gas.

1.04 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose (Inch); 2013 (Reaffirmed 2018).
- B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2015.
- C. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2017.
- D. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2017.
- E. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2018.
- F. ASME B16.34 - Valves - Flanged, Threaded and Welding End; 2017.

- G. ASME B31.9 - Building Services Piping; 2017.
- H. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.
- I. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2014).
- J. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017.
- K. AWWA C606 - Grooved and Shouldered Joints; 2015.
- L. MSS SP-45 - Bypass and Drain Connections; 2003 (Reaffirmed 2008).
- M. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.
- N. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.
- O. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
- P. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- Q. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.
- E. Maintenance Materials: Furnish Owner with one wrench for every five plug valves, in each size of square plug valve head.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Manufacturer:
 - 1. Obtain valves for each valve type from single manufacturer.
 - 2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Welding Materials and Procedures: Comply with ASME BPVC-IX.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.

2. Protect valve parts exposed to piped medium against rust and corrosion.
 3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
 4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
 5. Secure check valves in either the closed position or open position.
 6. Adjust butterfly valves to closed or partially closed position.
- B. Use the following precautions during storage:
1. Maintain valve end protection and protect flanges and specialties from dirt.
 - a. Provide temporary inlet and outlet caps.
 - b. Maintain caps in place until installation.
 2. Store valves in shipping containers and maintain in place until installation.
 - a. Store valves indoors in dry environment.
 - b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. See drawings for specific valve locations.
- B. Provide the following valves for the applications if not indicated on drawings:
1. Shutoff: Ball, butterfly, gate or plug.
 2. Dead-End: Single-flange butterfly (lug) type.
 3. Throttling: Provide globe, angle, ball, or butterfly.
 4. Swing Check (Pump Outlet):
 - a. 2 NPS and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
- C. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.
- D. Required Valve End Connections for Non-Wafer Types:
1. Steel Pipe:
 - a. 2 NPS and Smaller: Threaded ends.
 - b. 2-1/2 NPS to 4 NPS: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
 2. Copper Tube:
 - a. 2 NPS and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 - b. 2-1/2 NPS to 4 NPS: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
- E. Domestic, Hot and Cold Water Valves:
1. 2 NPS and Smaller:
 - a. Bronze and Brass: Provide with solder-joint ends.
 - b. Bronze Angle: Class 125, bronze disc.
 - c. Ball: One piece, full port, brass with brass trim.
 - d. Bronze Swing Check: Class 125, bronze disc.
 - e. Bronze Gate: Class 125, NRS.
 - f. Bronze Globe: Class 125, bronze disc.
 2. 2-1/2 NPS and Larger:
 - a. Iron, 2-1/2 NPS to 4 NPS: Provide with threaded ends.
 - b. Iron Ball: Class 150.

2.02 GENERAL REQUIREMENTS

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.
- C. Valves in Insulated Piping: With 2 NPS stem extensions and the following features:
 - 1. Gate Valves: Rising stem.
 - 2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - 3. Butterfly Valves: Extended neck.
- D. Valve-End Connections:
 - 1. Threaded End Valves: ASME B1.20.1.
 - 2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
 - 3. Pipe Flanges and Flanged Fittings 1/2 NPS through 24 NPS: ASME B16.5.
 - 4. Solder Joint Connections: ASME B16.18.
 - 5. Grooved End Connections: AWWA C606.
- E. General ASME Compliance:
 - 1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
 - 2. Solder-joint Connections: ASME B16.18.
 - 3. Building Services Piping Valves: ASME B31.9.
- F. Potable Water Use:
 - 1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
 - 2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.
- G. Valve Bypass and Drain Connections: MSS SP-45.

2.03 BRASS, BALL VALVES

- A. One-Piece, Reduced-Port with Brass Trim:
 - 1. Comply with MSS SP-110.
 - 2. Body: Forged brass.
 - 3. Ends: Threaded.
 - 4. Seats: PTFE.
 - 5. Stem: Brass.
 - 6. Ball: Chrome-plated brass.
 - 7. Manufacturers:
 - a. Ferguson Enterprises Inc: www.fnw.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.04 BRONZE, BALL VALVES

- A. General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. One Piece, Reduced Port with Bronze Trim:

1. Comply with MSS SP-110.
2. SWP Rating: 400 psig.
3. CWP Rating: 600 psig.
4. Body: Bronze.
5. Ends: Press.
6. Seats: PTFE.
7. Stem: Bronze.
8. Ball: Chrome plated brass.
9. Manufacturers:
 - a. Viega LLC: www.viega.us/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.05 IRON, BALL VALVES

- A. Class 125, Full Port, Stainless Steel Trim:
 1. Comply with MSS SP-72.
 2. CWP Rating: 200 psig.
 3. Body: ASTM A536, Grade 65-45-12, ductile iron.
 4. Ends: Flanged.
 5. Seats: PTFE.
 6. Operator: Lever, with locking handle.
 7. Manufacturers:
 - a. Apollo Valves: www.apollovalves.com/#sle.
 - b. Ferguson Enterprises Inc: www.fnw.com/#sle.
 - c. Substitutions: See Section 016000 - Product Requirements.

2.06 BRONZE, SWING CHECK VALVES

- A. General:
 1. Fabricate from dezincification resistant material.
 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Class 125: CWP Rating: 200 psig (1380 kPa).
 1. Comply with MSS SP-80, Type 3.
 2. Design: Y-pattern, horizontal or vertical flow.
 3. Body: Bronze, ASTM B62.
 4. Ends: Threaded.
 5. Disc: Bronze.

2.07 BRONZE, GATE VALVES

- A. General:
 1. Fabricate from dezincification resistant material.
 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Rising Stem (RS):
 1. Comply with MSS SP-80, Type I.
 2. Class 125: CWP Rating: 200 psig.
 3. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
 4. Ends: Threaded or solder joint joint.
 5. Stem: Bronze.
 6. Disc: Solid wedge; bronze.
 7. Packing: Asbestos free.
 8. Handwheel: Malleable iron, bronze, or aluminum.

2.08 BRONZE, GLOBE VALVES

- A. General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Class 125: CWP Rating: 200 psig:
 - 1. Comply with MSS SP-80, Type 1.
 - 2. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
 - 3. Ends: Threaded joint.
 - 4. Stem: Bronze.
 - 5. Disc: PTFE.
 - 6. Packing: Asbestos free.
 - 7. Handwheel: Malleable Iron.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.
- B. Verify valve parts to be fully operational in all positions from closed to fully open.
- C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- C. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- D. Install check valves where necessary to maintain direction of flow as follows:
 - 1. Lift Check: Install with stem plumb and vertical.
 - 2. Swing Check: Install horizontal maintaining hinge pin level.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Support and attachment components for equipment, piping, and other plumbing work.

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General - Purpose Piping; 2014.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).
- F. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- G. MFMA-4 - Metal Framing Standards Publication; 2004.
- H. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
- C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

1.04 QUALITY ASSURANCE

- A. Comply with applicable building code.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.
- D. Installer Qualifications for Field-Welding: As specified in Section 055000.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS**2.01 SUPPORT AND ATTACHMENT COMPONENTS**

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
 - 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Piping up to 1 inch (27 mm) nominal: 1/4 inch diameter.
 - c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.
- C. Beam Clamps: MSS SP-58 Types 19 through 23, 25 or 27 through 30 based on required load.
 - 1. Manufacturers:
 - a. Ferguson Enterprises Inc: www.fnw.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
 - c. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
 - 2. Material: ASTM A36/A36M carbon steel or ASTM A181/A181M forged steel.
 - 3. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
- D. Riser Clamps:
 - 1. Manufacturers:
 - a. Ferguson Enterprises Inc: www.fnw.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
 - 2. Provide copper plated clamps for copper tubing support.
 - 3. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
- E. Pipe Hangers: For a given pipe run, use hangers of the same type and material.
 - 1. Manufacturers:
 - a. Ferguson Enterprises Inc: www.fnw.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
 - c. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
 - 2. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.

3. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
- F. Anchors and Fasteners:
1. Manufacturers - Mechanical Anchors:
 - a. Hilti, Inc: www.us.hilti.com/#sle.
 - b. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com/#sle.
 - c. Powers Fasteners, Inc: www.powers.com/#sle.
 - d. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.
 - e. Substitutions: See Section 016000 - Product Requirements.
 2. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 3. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 4. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 5. Hollow Masonry: Use toggle bolts.
 6. Hollow Stud Walls: Use toggle bolts.
 7. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 8. Sheet Metal: Use sheet metal screws.
 9. Wood: Use wood screws.
 10. Plastic and lead anchors are not permitted.
 11. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by Architect/Engineer, do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by Architect/Engineer, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Equipment Support and Attachment:
 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.

2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- G. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.
- H. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment components for equipment, piping, and other plumbing work.

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General - Purpose Piping; 2014.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).
- F. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- G. MFMA-4 - Metal Framing Standards Publication; 2004.
- H. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
- C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

1.04 QUALITY ASSURANCE

- A. Comply with applicable building code.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.
- D. Installer Qualifications for Field-Welding: As specified in Section 055000.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS**2.01 SUPPORT AND ATTACHMENT COMPONENTS**

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
 - 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Piping up to 1 inch (27 mm) nominal: 1/4 inch diameter.
 - c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.
- C. Beam Clamps: MSS SP-58 Types 19 through 23, 25 or 27 through 30 based on required load.
 - 1. Manufacturers:
 - a. Ferguson Enterprises Inc: www.fnw.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
 - c. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
 - 2. Material: ASTM A36/A36M carbon steel or ASTM A181/A181M forged steel.
 - 3. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
- D. Riser Clamps:
 - 1. Manufacturers:
 - a. Ferguson Enterprises Inc: www.fnw.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
 - 2. Provide copper plated clamps for copper tubing support.
 - 3. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
- E. Pipe Hangers: For a given pipe run, use hangers of the same type and material.
 - 1. Manufacturers:
 - a. Ferguson Enterprises Inc: www.fnw.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
 - c. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.

2. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
 3. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
- F. Anchors and Fasteners:
1. Manufacturers - Mechanical Anchors:
 - a. Hilti, Inc: www.us.hilti.com/#sle.
 - b. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com/#sle.
 - c. Powers Fasteners, Inc: www.powers.com/#sle.
 - d. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.
 - e. Substitutions: See Section 016000 - Product Requirements.
 2. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 3. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 4. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 5. Hollow Masonry: Use toggle bolts.
 6. Hollow Stud Walls: Use toggle bolts.
 7. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 8. Sheet Metal: Use sheet metal screws.
 9. Wood: Use wood screws.
 10. Plastic and lead anchors are not permitted.
 11. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by Architect/Engineer, do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by Architect/Engineer, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- G. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.
- H. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe markers.

1.02 RELATED REQUIREMENTS

- A. Section 099123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Instrumentation: Tags.
- B. Piping: Tags.
- C. Pumps: Nameplates.
- D. Small-sized Equipment: Tags.
- E. Thermostats: Nameplates.
- F. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Brimar Industries, Inc: www.pipemarker.com/#sle.
 - 2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.

3. Seton Identification Products: www.seton.com/#sle.
 4. Substitutions: See Section 016000 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.
1. Letter Color: White.
 2. Letter Height: 1/4 inch.
 3. Background Color: Black.
 4. Plastic: Comply with ASTM D709.

2.03 TAGS

- A. Manufacturers:
1. Advanced Graphic Engraving: www.advancedgraphicengraving.com/#sle.
 2. Brady Corporation: www.bradycorp.com/#sle.
 3. Brimar Industries, Inc: www.pipemarker.com/#sle.
 4. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
 5. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 6. Seton Identification Products: www.seton.com/#sle.
 7. Substitutions: See Section 016000 - Product Requirements.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 STENCILS

- A. Manufacturers:
1. Brady Corporation: www.bradycorp.com/#sle.
 2. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
 3. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com/#sle.
 4. Seton Identification Products: www.seton.com/#sle.
 5. Substitutions: See Section 016000 - Product Requirements.
- B. Stencils: With clean cut symbols and letters of following size:
1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
 2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
 3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
- C. Stencil Paint: As specified in Section 099123, semi-gloss enamel, colors complying with ASME A13.1.

2.05 PIPE MARKERS

- A. Manufacturers:
1. Brady Corporation: www.bradycorp.com/#sle.
 2. Brimar Industries, Inc: www.pipemarker.com/#sle.
 3. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
 4. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.

5. Seton Identification Products: www.seton.com/#sle.
 6. Substitutions: See Section 016000 - Product Requirements.
- B. Comply with ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 099123 for stencil painting.

3.02 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Apply stencil painting in accordance with Section 099123.
- D. Install plastic pipe markers in accordance with manufacturer's instructions.
- E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- G. Use tags on piping 3/4 inch diameter and smaller.
1. Identify service, flow direction, and pressure.
 2. Install in clear view and align with axis of piping.
 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe markers.

1.02 RELATED REQUIREMENTS

- A. Section 099123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Instrumentation: Tags.
- B. Piping: Tags.
- C. Pumps: Nameplates.
- D. Small-sized Equipment: Tags.
- E. Thermostats: Nameplates.
- F. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Brimar Industries, Inc: www.pipemarker.com/#sle.
 - 2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.

3. Seton Identification Products: www.seton.com/#sle.
 4. Substitutions: See Section 016000 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.
1. Letter Color: White.
 2. Letter Height: 1/4 inch.
 3. Background Color: Black.
 4. Plastic: Comply with ASTM D709.

2.03 TAGS

- A. Manufacturers:
1. Advanced Graphic Engraving: www.advancedgraphicengraving.com/#sle.
 2. Brady Corporation: www.bradycorp.com/#sle.
 3. Brimar Industries, Inc: www.pipemarker.com/#sle.
 4. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
 5. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 6. Seton Identification Products: www.seton.com/#sle.
 7. Substitutions: See Section 016000 - Product Requirements.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 STENCILS

- A. Manufacturers:
1. Brady Corporation: www.bradycorp.com/#sle.
 2. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
 3. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com/#sle.
 4. Seton Identification Products: www.seton.com/#sle.
 5. Substitutions: See Section 016000 - Product Requirements.
- B. Stencils: With clean cut symbols and letters of following size:
1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
 2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
 3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
- C. Stencil Paint: As specified in Section 099123, semi-gloss enamel, colors complying with ASME A13.1.

2.05 PIPE MARKERS

- A. Manufacturers:
1. Brady Corporation: www.bradycorp.com/#sle.
 2. Brimar Industries, Inc: www.pipemarker.com/#sle.
 3. Craftmark Pipe Markers: www.craftmarkid.com/#sle.

4. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 5. Seton Identification Products: www.seton.com/#sle.
 6. Substitutions: See Section 016000 - Product Requirements.
- B. Comply with ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 099123 for stencil painting.

3.02 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Apply stencil painting in accordance with Section 099123.
- D. Install plastic pipe markers in accordance with manufacturer's instructions.
- E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- G. Use tags on piping 3/4 inch diameter and smaller.
1. Identify service, flow direction, and pressure.
 2. Install in clear view and align with axis of piping.
 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Flexible removable and reusable blanket insulation.
- C. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 221005 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- B. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2019.
- C. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2018).
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018a.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

- A. Manufacturers:
 - 1. CertainTeed Corporation: www.certainteed.com/#sle.
 - 2. Johns Manville Corporation: www.jm.com/#sle.
 - 3. Knauf Insulation; Earthwool 1000 Degree Pipe Insulation: www.knaufinsulation.com/#sle.
 - 4. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ: www.ocbuildingspec.com/#sle.
 - 5. Owens Corning Corporation; VaporWick Pipe Insulation: www.ocbuildingspec.com/#sle.
 - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible, with wicking material to transport condensed water to the outside of the system for evaporation to the atmosphere.
 - 1. K Value: ASTM C177, 0.23 at 75 degrees F.
 - 2. Maximum Service Temperature: 220 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- D. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 650 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- E. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- F. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

2.03 JACKETS

- A. PVC Plastic.
 - 1. Manufacturers:
 - a. Johns Manville Corporation: www.jm.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
 - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.

- b. Maximum Service Temperature: 150 degrees F.
- c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
- d. Thickness: 10 mil.
- e. Connections: Brush on welding adhesive.
- 3. Covering Adhesive Mastic: Compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- 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. Install cellular melamine with factory-applied jackets with a manufacturer-approved adhesive along seams, both straight lap joints and circumferential lap joints.
 - 1. Install seal over seams with factory-approved room temperature vulcanization (RTV) silicone sealant to ensure a positive vapor barrier seal in outdoor and sanitary washdown environments.
- F. Glass fiber 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.
- G. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- H. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- I. Glass fiber 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 adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- J. Inserts and Shields:
 - 1. Application: Piping 1-1/2 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.

3. Insert Location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- K. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 078400.
- L. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting.
- 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 a polyester film.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Flexible removable and reusable blanket insulation.
- C. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 221005 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- B. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2019.
- C. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2018).
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018a.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

- A. Manufacturers:
 - 1. CertainTeed Corporation: www.certainteed.com/#sle.
 - 2. Johns Manville Corporation: www.jm.com/#sle.
 - 3. Knauf Insulation; Earthwool 1000 Degree Pipe Insulation: www.knaufinsulation.com/#sle.
 - 4. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ: www.ocbuildingspec.com/#sle.
 - 5. Owens Corning Corporation; VaporWick Pipe Insulation: www.ocbuildingspec.com/#sle.
 - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible, with wicking material to transport condensed water to the outside of the system for evaporation to the atmosphere.
 - 1. K Value: ASTM C177, 0.23 at 75 degrees F.
 - 2. Maximum Service Temperature: 220 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- D. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 650 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- E. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- F. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

2.03 JACKETS

- A. PVC Plastic.
 - 1. Manufacturers:
 - a. Johns Manville Corporation: www.jm.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
 - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.

- a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
3. Covering Adhesive Mastic: Compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- 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. Install cellular melamine with factory-applied jackets with a manufacturer-approved adhesive along seams, both straight lap joints and circumferential lap joints.
 1. Install seal over seams with factory-approved room temperature vulcanization (RTV) silicone sealant to ensure a positive vapor barrier seal in outdoor and sanitary washdown environments.
- F. Glass fiber 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.
- G. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- H. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- I. Glass fiber 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 adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- J. Inserts and Shields:

1. Application: Piping 1-1/2 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert Location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- K. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 078400.
- L. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting.
- 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 a polyester film.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Flanges, unions, and couplings.
 - 4. Pipe hangers and supports.
 - 5. Ball valves.
 - 6. Butterfly valves.

1.02 RELATED REQUIREMENTS

- A. Section 083100 - Access Doors and Panels.
- B. Section 099113 - Exterior Painting.
- C. Section 099123 - Interior Painting.
- D. Section 220516 - Expansion Fittings and Loops for Plumbing Piping.
- E. Section 220553 - Identification for Plumbing Piping and Equipment.
- F. Section 220719 - Plumbing Piping Insulation.
- G. Section 312316 - Excavation.
- H. Section 312323 - Fill.
- I. Section 330110.58 - Disinfection of Water Utility Piping Systems.

1.03 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2018.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2018.
- C. ASME B31.9 - Building Services Piping; 2017.
- D. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).
- F. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2017.
- G. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- H. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- I. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.

- J. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2018.
- K. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
- L. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.
- M. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2014.
- N. AWWA C606 - Grooved and Shouldered Joints; 2015.
- O. AWWA C651 - Disinfecting Water Mains; 2014.
- P. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2017 (Revised 2018).
- Q. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2012 (Revised 2018).
- R. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015.
- S. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2015.
- T. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2015.
- U. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2016.
- V. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018.
- W. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
- X. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- Y. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Welders' Certificates: Submit certification of welders' compliance with ASME BPVC-IX.
- D. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.

- E. Sustainable Design Documentation: For soldered copper joints, submit installer's certification that the specified installation method and materials were used.
- F. Project Record Documents: Record actual locations of valves.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.
- D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
- E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.03 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
 - 3. Mechanical Press Sealed Fittings: Double-pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, nontoxic, synthetic rubber sealing elements.
 - a. Manufacturers:
 - 1) Apollo Valves: www.apollovalves.com/#sle.
 - 2) Grinnell Products: www.grinnell.com/#sle.
 - 3) Viega LLC: www.viega.us/#sle.
 - 4) Substitutions: See Section 016000 - Product Requirements.

2.04 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded unions.
 - 2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Size Over 1 Inch:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
 - 2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
 - 1. Dimensions and Testing: In accordance with AWWA C606.
 - 2. Housing Material: Provide ASTM A47/A47M malleable iron or ductile iron, galvanized.
 - 3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 - 4. When pipe is field grooved, provide coupling manufacturer's grooving tools.
 - 5. Manufacturers:
 - a. Apollo Valves: www.apollovalves.com/#sle.
 - b. Grinnell Products: www.grinnell.com/#sle.
 - c. Substitutions: See Section 016000 - Product Requirements.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.05 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.
 - 5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.
 - 6. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
 - a. Bases: High-density polypropylene.

- b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - c. Steel Components: Stainless steel or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion-resistant material.
 - e. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.
- B. Plumbing Piping - Drain, Waste, and Vent:
 - 1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 4. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 - 5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Plumbing Piping - Water:
 - 1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 3. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
 - 4. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.
 - 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 - 7. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.
 - 8. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 9. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
 - 10. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.
 - 11. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
 - 5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
 - 6. Other Types: As required.

2.06 BALL VALVES

- A. Manufacturers:
 - 1. Apollo Valves: www.apollovalves.com/#sle.
 - 2. Grinnell Products: www.grinnell.com/#sle.
 - 3. Nibco, Inc: www.nibco.com/#sle.
 - 4. Uponor, Inc: www.uponorengineering.com/#sle.

5. Viega LLC: www.viega.us/#sle.
 6. Substitutions: See Section 016000 - Product Requirements.
- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- 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.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 220516.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
1. See Section 220719.
- H. Provide access where valves and fittings are not exposed.
1. Coordinate size and location of access doors with Section 083100.
- I. Establish elevations of buried piping outside the building to ensure not less than 3 ft of cover.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
- K. Provide support for utility meters in accordance with requirements of utility companies.
- L. Prepare exposed, unfinished pipe, fittings, supports, and accessories for finish painting.
1. See Section 099123 for painting of interior plumbing systems and components.
 2. See Section 099113 for painting of exterior plumbing systems and components.

- M. Excavate in accordance with Section 312316.
- N. Backfill in accordance with Section 312323.
- O. Install bell and spigot pipe with bell end upstream.
- P. Install valves with stems upright or horizontal, not inverted. See Section 220523.
- Q. Install water piping to ASME B31.9.
- R. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- S. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- T. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as indicated.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 8. Provide copper plated hangers and supports for copper piping.
 - 9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
 - a. Painting of interior plumbing systems and components is specified in Section 099123.
 - b. Painting of exterior plumbing systems and components is specified in Section 099113.
 - 10. Provide hangers adjacent to motor-driven equipment with vibration isolation; see Section 220548.
 - 11. Support cast iron drainage piping at every joint.
- U. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.04 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.

- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- D. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.05 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect water distribution system in accordance with Section 330110.58.
- B. Prior to starting work, verify system is complete, flushed, and clean.
- C. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.07 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1/2 inches to 1-1/4 inches:
 - 1) Maximum Hanger Spacing: 6.5 ft.
 - 2) Hanger Rod Diameter: 3/8 inches.
 - b. Pipe Size: 1-1/2 inches to 2 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 3/8 inch.
 - c. Pipe Size: 2-1/2 inches to 3 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 1/2 inch.
 - d. Pipe Size: 4 inches to 6 inches:
 - 1) Maximum Hanger Spacing: 10 ft.

- 2) Hanger Rod Diameter: 5/8 inch.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drains.
- B. Cleanouts.
- C. Hose bibbs.
- D. Water hammer arrestors.

1.02 RELATED REQUIREMENTS

- A. Section 221005 - Plumbing Piping.
- B. Section 224000 - Plumbing Fixtures.

1.03 REFERENCE STANDARDS

- A. ASME A112.6.3 - Floor and Trench Drains; 2019.
- B. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2017.
- C. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- D. NSF 372 - Drinking Water System Components - Lead Content; 2016.
- E. PDI-WH 201 - Water Hammer Arresters; 2017.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- D. Certificates: Certify that grease interceptors meet or exceed specified requirements.
- E. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- F. Sustainable Design Documentation: Submit appropriate evidence that materials used in potable water systems comply with the specified requirements.
- G. Operation Data: Indicate frequency of treatment required for interceptors.
- H. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- I. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors.
- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

2. Extra Loose Keys for Outside Hose Bibbs: One.
3. Extra Hose End Vacuum Breakers for Hose Bibbs: One.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

- A. Floor Drains:
 1. Manufacturers:
 - a. Sioux Chief; Model 832.
 - b. Substitutions: See Section 016000 - Product Requirements.
- B. Floor Drain (FD-1):
 1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.
 2. Square Strainer.
 3. Trap Seal Zurn model Z1072.

2.03 CLEANOUTS

- A. Manufacturers:
 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 2. Josam Company: www.josam.com/#sle.
 3. Zurn Industries, LLC: www.zurn.com/#sle.
 4. Substitutions: See Section 016000 - Product Requirements.
- B. Cleanouts at Interior Finished Floor Areas:
 1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
- C. Cleanouts at Interior Finished Wall Areas:
 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

2.04 HOSE BIBBS

- A. Manufacturers:
 1. Murdock Manufacturing, Inc; Model 8120-LF: www.murdockmfg.com/#sle.
 2. Substitutions: See Section 016000 - Product Requirements.

B. Interior Hose Bibbs:

1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with handwheel, integral vacuum breaker in compliance with ASSE 1011.

2.05 WATER HAMMER ARRESTORS

A. Manufacturers:

1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
2. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com/#sle.
3. Zurn Industries, LLC: www.zurn.com/#sle.
4. Substitutions: See Section 016000 - Product Requirements.

B. Water Hammer Arrestors:

1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F and maximum 250 psi working pressure.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Encase exterior cleanouts in concrete flush with grade.
- D. Install floor cleanouts at elevation to accommodate finished floor.
- E. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
- F. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatory sinks or washing machine outlets.

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. USAS USA Standards Institute (Formerly ASA)
 - 3. AMCA Air Moving and Conditioning Association
 - 4. ADC Air Diffusion Council
 - 5. NEMA National Electrical Manufacturers Association
 - 6. FM Factory Mutual
 - 7. NFPA National Fire Protection Association
 - 8. ASTM American Society for Testing Materials
 - 9. UL Underwriters Laboratories, Inc.
 - 10. NEC National Electrical Code
 - 11. ASME American Society of Mechanical Engineers
 - 12. ANSI American National Standards Institute
 - 13. OSHA Occupational Safety and Health Act
 - 14. BSA Board of Standards and Appeals
 - 15. MEA Materials and Equipment Acceptance
 - 16. DEC New York State Department of Environmental Conservation - 6 NYCRR Part 613 Handling and Storage of Petroleum
 - 17. ASHRAE American Society of Heating, Refrigeration and Air Conditioning Engineers.
 - 18. AWWA American Water Works Association

19.	MSS	Manufacturer's Standardization Society of the Valve and Fitting Industry
20.	ARI	American Refrigeration Institute
21.	SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
22.	TEMA	Tubular Exchanger Manufacturers Association
23.	F.S. or FED	Spec. Federal Specification
24.	ASA	Acoustical Society of America
25.	NACE	National Association of Corrosion Engineers
26.	ASSE	American Society of Sanitary Engineers
27.	International Building Code	
28.	International Fire Code	
29.	International Existing Building Code	
30.	International Fuel Gas Code	
31.	International Plumbing Code	
32.	International Energy Conservation Code	
33.	International Mechanical Code	
34.	New York State Industrial Code Rules	
35.	IRI	Industrial Risk Insurers
36.	AGA	American Gas Association
37.	AABC	American Air Balance Council
38.	NEBB	National Environmental Balancing Bureau
39.	AWS	American Welding Society

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 not 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, shop drawings for all materials and equipment furnished and installed under this Contract. Submissions shall include but not be limited to:
 - 1. Ductwork layout drawings, air devices and accessories
 - 2. Breeching layout drawings
 - 3. Piping and equipment layout drawings.
 - 4. Piping materials, valves, hangers, supports and accessories
 - 5. Automatic temperature control equipment, diagrams and control sequences
 - 6. Equipment, fixtures, and appurtenances
 - 7. Insulation
 - 8. Rigging Plan - 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.
- 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.

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 MATERIAL SAFETY DATA SHEETS

- A. Submit material safety data sheets (MSDS) 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. 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.

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 2002 or later in .dwg format. Upon completion of the Work, submit to the Architect/Engineer for approval three complete sets of hard copies of the record drawings, of the same size as the Drawings for approval. Upon approval by the Architect/Engineer furnish the Owner a CD copy of the record drawings along with one hard copy for his 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. 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.
- B. Where applicable, provide instruction and training, including application of special coatings systems, at manufacturer's recommendation.
- C. 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
- D. Warranties, bonds, maintenance agreements, and similar continuing commitments.
- E. 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.
- F. 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)
Roof Top Units	8 hrs.
All other equipment	4 hrs. (each)

Note: Consult individual equipment specification sections for additional training requirements.

- G. Prepare a written agenda for each session and submit for review and approval. Include date, location, purpose, specific scope, proposed attendance and session duration.
- H. 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 230010

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. BOCA Building Code
- B. NFPA Fire Code
- C. ANSI A10.6 - Safety Requirements for Demolition
- D. National Association of Demolition Contractors (NADC) - Demolition Safety Manual
- E. NFPA 51B - Cutting and Welding Processes
- F. NFPA 70 - National Electrical Code
- G. NFPA 241 - Safeguarding Building Construction and Demolition Operations
- H. OSHA 29 CRF 1910 - Occupational Safety and Health Standards
- I. US EPA - Clean Air Act Amendment of 1990.

1.04 SUBMITTALS

- A. Demolition Schedule
- B. Fire Watch Procedures
- C. Inspection Report of Underground Piping Systems
- D. Welding/Burning Permit - 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 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.

3.04 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.

3.05 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.

3.06 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.

3.07 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.

END OF SECTION 230015

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

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
- G. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices

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 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.
- B. Submit Pipe Hanger and Support Application Schedule.

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. 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.

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.

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. 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 $\frac{3}{4}$ 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 $\frac{3}{4}$ 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 reengagement, 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-69 Tables 3 and 4, excerpts of which follow below:

NOMINAL PIPE SIZE (INCHES)	ROD DIAMETER (INCHES)	MAXIMUM SPACING (FEET)
1/2 to 1-1/4	3/8	6
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	13
4	5/8	14
5	5/8	16
6	3/4	17
8	3/4	19
10	7/8	22
12	7/8	23
14	1	25
16	1	27

- G. 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
2-1/2	1/2	9
3	1/2	10
3-1/2	1/2	11
4	1/2	12
5	1/2	13
6	5/8	14
8	3/4	16

- H. For grooved end steel pipe:

NOMINAL PIPE SIZE (INCHES)	MAXIMUM SPACING (FEET)
1-1/2 and under	7

2 through 4	10
5 and over	12

Do not leave any pipe length unsupported between any two coupling joints.

- I. 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.
- J. Install hangers to provide a minimum of 1/2 inch space between finished covering and adjacent work.
- K. Place a hanger within 12 inches of each horizontal elbow.
- L. 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.
- M. 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.
- N. Do not support piping from other pipes, ductwork or other equipment that is not building structure.
- O. 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.
- P. 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. E. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inch.

END OF SECTION 230529

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section describes the marking and identification materials for identifying mechanical equipment, and ductwork systems.
- B. Mark and identify all mechanical equipment, and ductwork 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. Identification Scheme - Submit scheme of identification codes.
- B. Samples - Submit samples of tags, attachments, labeled and identified.
- C. Equipment Schedules - Submit mechanical equipment schedules, listing proposed equipment numbers, and their location and function.
- D. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Seton
- B. Bunting
- C. W.H. Brady Company

2.02 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.

2.03 DUCT WORK 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 all tags and system markers in accordance with the manufacturer's instructions.

3.02 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.

END OF SECTION 230555

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 1 Specification Sections, govern the work of this section.

1.03 SUBMITTALS

- A. Submit proof that the testing, adjusting and balancing agency meets the requirements of Section 1.04 "Quality Assurance", and all other specified requirements.
- B. Prior to performing the work, submit sample blank forms of the test reports that will be submitted by the entity performing work of this Section, indicating all data and parameters included.
- C. 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 two complete sets 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 two complete sets 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. Enclose the report contents in a 3-ring binder. Divide the contents into the below listed divisions, separating them by divider tabs 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 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 230594

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 078400 - Firestopping
- B. Section 078413 - Through Penetration Firestopping for HVAC Systems
- C. Section 079201 - Non Fire Rated Sleeves and Seals
- 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. Greenguard
- C. 2015 International Energy Conservation Code
- D. 2015 International Mechanical Code
- E. Underwriters Laboratories, Inc. (UL):
 - 1. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.
- F. 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 C 552 - Standard Specification for Cellular Glass Thermal Insulation
 - 12. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - 13. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

14. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing.
15. ASTM C 591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
16. ASTM C 610 - Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation.
17. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
18. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
19. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
20. ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
21. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.
22. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
23. 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 AgencyA
- 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. Product data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- B. Manufacturer's Instructions: Indicate installation procedures 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 <<302; 304; 316>> 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

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 1/2-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 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

3.05 MINIMUM PIPING INSULATION THICKNESS (IN.)

FLUID OPERATING TEMP RANGE (°F)	SYSTEMS IN TEMP RANGE	INSUALATION 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 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. Greenguard
- C. 2015 International Energy Conservation Code
- 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. 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 C 553 Types I, II and III, and ASTM C 1290; Greenguard compliant.
- B. Factory Applied Vapor Retarder Jacket: FSK or PSK conforming to ASTM C 1136 Type II.

- C. Maximum service temperature of 250° 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 C 612 Type IA and IB.
- B. Mean temperature by ASTM C 177 and a maximum service temperature of 450° F.
- C. Factory Applied Vapor Retarder Jacket: ASJ conforming to ASTM C 1136 Type I, or FSK or PSK conforming to ASTM C 1136 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 INTERNAL DUCT LINING

- A. Conforming to ASTM C 1071 Type 1 and NFPA 90A & 90B.
- B. Noise Reduction Coefficient (NRC): ASTM C 423 Type A Mounting, 0.40 or higher for ½" product, 0.60 or higher for 1" product.
- C. Rated for a maximum air velocity of 6000 Feet per minute.
- D. Approved Products:
 - 1. Textile Duct Liner with Hydroshield® Technology by Knauf.

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 D 1970, 40 Mils Nominal
- E. Flexibility: ASTM D 1970, Pass.
- F. Vapor Permeance: ASTM E 96, 0 perms.
- G. Nail Sealability: ASTM D 1970, Pass.
- H. Heat Aging: ASTM D 794, Pass.
- I. Tear Resistance: ASTM D 1424, Average: 660 grams.
- J. Ultimate Elongation MD: ASTM D 412, 434 percent.
- K. Ultimate Elongation CMD: ASTM D 412, 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 E 84, 0.
- N. Smoke Density Index: ASTM E 84, 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 FIBERGLASS INTERNAL DUCT LINING

- 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" relative to the nominal thickness of the insulation.
- C. Adhesive shall conform to ASTM C 916. 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 C 916.
- 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. When air velocities are 4000 to 6000 FPM, apply metal nosing to all upstream 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 $\frac{1}{4}$ 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
All Supply And Return Ductwork for Stage and Auditorium, Located Indoors.	Fiberglass Internal Duct Lining	Note 1
All Supply And Return Ductwork for Stage and Auditorium, Located Outdoors.	Fiberglass Internal Duct Lining	Note 1
General Exhaust Ducts Except as Noted	Uninsulated	NA

NOTE 1 - Ductwork to be provided with 1-inch internal lining in addition to externally applied insulation in accordance with the table above.

END OF SECTION 230719

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 at the time of bid the name and qualifications of the firm that will be responsible for the Integration function along with the qualifications of the specific personnel proposed. The Owner and Architect/Engineer may choose to interview the personnel proposed for the project.
- 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. 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.
- D. 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.
- E. Submit any additional information or data which is deemed necessary to determine compliance with these specifications or which is deemed valuable in documenting the system to be installed.
- F. Submit the following within 30 days of contract award:
 - 1. 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.
 - 2. A complete list of equipment to be used indicating quantity, manufacturer and model number.
 - 3. A schedule of all control valves including the valve size, model number (including pattern and connections), flow, CV, pressure rating, and location.
 - 4. A schedule of all control dampers. This shall include the damper size, pressure drop, manufacturer and model number.
 - 5. 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.
 - 6. 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.

1.05 WARRANTY

- A. 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 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.

2.03 HUMIDITY SENSORS

- A. Room Humidity sensors shall have an accuracy of $\pm 1\%$ 25°C 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 $\pm 1\%$ 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.

2.04 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.

2.05 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.

2.06 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.

2.07 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.

2.08 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.

2.09 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.

2.10 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 WARNING LABELS

- A. Affix plastic labels on each starter and equipment automatically controlled. Label shall indicate the following:

CAUTION

This equipment is operating under automatic control and may start at any time without warning.

3.05 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.

3.06 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.

3.07 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.

3.08 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.

3.09 ACCEPTANCE

- A. 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 230991

PART 1 - GENERAL

1.01 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, trouble shooting, adjustment and repair of all system controls.

1.02 RELATED SECTIONS AND WORK

- A. Division 26
- B. Owner's Building Management System (BMS)
- C. Owner's Fire Alarm System (FAS)

PART 2 - PRODUCTS

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

3.02 SEQUENCE OF OPERATION - CABINET UNIT HEATER, CUH-1

- A. General:
 - 1. Cabinet unit heater shall be provided with a BMS compatible wall mounted thermostat.
- B. Heating:
 - 1. The heating set point temperature shall be 68 degrees (adj). When the space temperature falls below the set point temperature, the cabinet unit heater shall turn on in order to maintain the set point temperature.

2. Fan in the cabinet unit heaters CUH-1 are providing outside air and shall:
 - a. Occupied Hours: Continuously operate
 - b. Unoccupied Hours: Operate intermittently

3.03 SEQUENCE OF OPERATION - EXHAUST FANS, TX-1

- A. General:
 1. The exhaust fan shall run continuously during occupied hours as defined by user (adj).

3.04 SEQUENCE OF OPERATION - PACKAGED ROOFTOP UNIT, RTU-1 & 2

- A. General Notes:
 1. New Packaged Rooftop Unit shall be cooling only.
 2. Existing heating and ventilation equipment shall remain. Contractor to modify existing heating controls to provide a 5 degree deadband between the the heating and cooling setpoints. Existing ventilation units serving the auditorium / stage shall sequence off when the new cooling only rooftop unit is run.
- B. Run Conditions - Scheduled:
 1. The unit shall run according to a user definable time schedule in the following modes:
 - a. Occupied Mode: The unit shall maintain
 - 1) A 75 degree F (adj.) cooling set point.
 - b. Unoccupied Mode: The unit shall maintain
 - 1) A 85 degree F (adj.) cooling set point.
 2. Alarms shall be provided as follows:
 - a. High Zone Temp: If the zone temperature is greater than the cooling set point by a user definable amount (adj.).
 - b. Low Zone Temp: If the zone temperature is less than the heating set point by a user definable amount (adj.).
- C. Zone Set point Adjust:
 1. The occupant shall be able to adjust the zone temperatur cooling set point at the zone sensor.
- D. Supply Fan:
 1. The supply fan shall run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a user definable (adj.) minimum runtime.
 2. Alarms shall be provided as follows:
 - a. Supply Fan Failure: Commanded on, but the status is off.
- E. Cooling Stages:
 1. The controller shall measure the zone temperature and stage the cooling to maintain its cooling set point. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.
 2. The cooling shall be enabled whenever:
 - a. Outside air temperature is greater than 60 degree F (adj.).
 - b. AND the economizer (if present) is disabled or fully open.
 - c. AND the zone temperature is above cooling set point.
 - d. AND the supply fan status is on.
 - e. AND the heating is not active.
- F. Economizer:
 1. The controller shall measure the zone temperature and modulate the economizer dampers in sequence to maintain a set point 2 degree F less than the zone cooling set point. The

- outside air dampers shall maintain a minimum adjustable position required to maintain code required outdoor air flow whenever occupied.
2. The economizer shall be enabled whenever:
 - a. Outside air temperature is less than 65 degree F (adj.).
 - b. AND the outside air enthalpy is less than 22% (adj.).
 - c. AND the outside air temperature is less than the return air temperature.
 - d. AND the outside air enthalpy is less than the return air enthalpy.
 - e. AND the supply fan status is on.
 3. The economizer shall close whenever:
 - a. Mixed air temperature drops from 45 degree F to 40 degree F (adj.).
 - b. OR on loss of supply fan status.
 - c. OR Freezestat (if present) is on.
 4. The outside and exhaust air dampers shall close and the return air damper shall open when the unit is off. If Optimal Start Up is available, the mixed air damper shall operate as described in the occupied mode except that the outside air damper shall modulate to fully closed.
- G. Un-Occupied to Occupied Transition Pre-purge
1. The BMS shall command the RTU to engage the supply fan and power exhauster. The RTU return air and outdoor air dampers shall open to the maximum occupied outside air position.
 2. The system shall operate in this purge mode for 30 minutes. The unit shall then switch to the occupied mode of operation.
- H. Occupied to Un-occupied Transition Post-purge
1. The BMS shall command the RTU to engage the supply fan and power exhauster. The RTU return air and outdoor air dampers shall open to the maximum occupied outside air position.
 2. The system shall operate in this purge mode until the CO2 levels within the space are reduced to the outdoor ambient CO2 level. The unit shall then switch to the un-occupied mode of operation.
- I. Dehumidification:
1. The controller shall measure the return air humidity and override the cooling sequence to maintain return air humidity at or below 60% rh (adj.). Dehumidification shall be enabled whenever the supply fan status is on.
- J. Prefilter Status:
1. The controller shall monitor the prefilter status.
 2. Alarms shall be provided as follows:
 - a. Prefilter Change Required: Prefilter differential pressure exceeds a user definable limit (adj.).
- K. Mixed Air Temperature:
1. The controller shall monitor the mixed air temperature and use as required for economizer control (if present) or preheating control (if present).
 2. Alarms shall be provided as follows:
 - a. High Mixed Air Temp: If the mixed air temperature is greater than 90 degree F (adj.).
 - b. Low Mixed Air Temp: If the mixed air temperature is less than 45 degree F (adj.).
- L. Return Air Humidity:
1. The controller shall monitor the return air humidity and use as required for economizer control (if present) or humidity control (if present).
 2. Alarms shall be provided as follows:
 - a. High Return Air Humidity: If the return air humidity is greater than 70% (adj.).

- b. Low Return Air Humidity: If the return air humidity is less than 35% (adj.).

M. Return Air Temperature:

1. The controller shall monitor the return air temperature and use as required for economizer control (if present).
2. Alarms shall be provided as follows:
 - a. High Return Air Temp: If the return air temperature is greater than 90 degree F adj.).
 - b. Low Return Air Temp: If the return air temperature is less than 45 degree F (adj.).

N. Supply Air Temperature:

1. The controller shall monitor the supply air temperature.
2. Alarms shall be provided as follows:
 - a. High Supply Air Temp: If the supply air temperature is greater than 120 degree F (adj.).
 - b. Low Supply Air Temp: If the supply air temperature is less than 45 degree F (adj.).

O. System Points

Point Name	Hardware Points				Software Points						Show On Graphic
	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	
Zone Temp	x								x		x
Zone CO2	x										
Outside Air Humidity (Network)	x								x		x
Outside Air Temp (Network)	x								x		x
Mixed Air Temp	x								x		x
Return Air Humidity	x								x		x
Return Air Temp	x								x		x
Supply Air Temp	x								x		x
Mixed Air Dampers		x							x		x
Supply Fan Status			x						x		x
Prefilter Status			x						x		
Supply Fan Start/Stop				x					x		x
Cooling Stage 1				x					x		x
Cooling Stage 2				x					x		x

	Hardware Points				Software Points						
Heating Stage 1											
Heating Stage 2											
Economizer Zone Temp Set point					x				x		x
Schedule								x			
Heating Set Point											
Cooling Set point									x		x
High Zone Temp										x	
Low Zone Temp										x	
Supply Fan Failure										x	
High Mixed Air Temp										x	
Low Mixed Air Temp										x	
High Return Air Humidity										x	
Low Return Air Humidity										x	
High Return Air Temp										x	
Low Return Air Temp										x	
High Supply Air Temp										x	
Low Supply Air Temp										x	

P. Outside Air Damper Control:

1. A one-time measurement of the outdoor air CO2 concentration shall be performed at the building site. This value shall serve as the minimum CO2 Concentration (C-s-min). Programmed value shall not exceed 350 PPM.
2. During all occupied modes the outside air damper shall be controlled to the effective minimum airflow operator adjustable with minimum setpoint, unless the economizing mode or mixed air temperature control routines are active. The outside air damper shall be closed during the Unoccupied mode, morning warm-up and pre-cool modes or when the outside air temperature falls below a Low Ambient Damper Lockout Set point (operator adjustable).
3. The AHU outdoor-air damper shall be controlled to deliver required outdoor airflow at all load conditions. The outdoor airflow setpoint shall be determined according to ASHRAE

Standard 62-2007, Equation 6. The actual outdoor airflow shall be sensed at the outdoor air intake via an airflow measuring station.

4. During all occupied modes and when the fan is running, the controller shall reset the outdoor air ventilation setpoint from its minimum to maximum, in direct response to the highest individual hardwired CO₂ level in the space, regulating the amount of fresh air allowed to enter the space. The CO₂ room sensor shall calculate a level of concentration, to be used in the control loop. The ventilation setpoint shall increase as CO₂ level rises above the Minimum CO₂ Level Setpoint (operator adjustable) noted as "Minimum CO₂ Concentration (Cs-min)" on the Demand Controlled Ventilation schedule located on the drawings. The outdoor air ventilation setpoint shall be at maximum when the CO₂ level reaches the Maximum CO₂ Threshold (operator adjustable) noted as "Design CO₂ Concentration (Cs-design)" on the Demand Controlled ventilation schedule located below. Design airflows and CO₂ concentrations are tabulated in the schedule below:

Demand Control Ventilation Schedule			
Minimum CO ₂ Concentration (Cs-min)	Outdoor Airflow at Minimum CO ₂ Concentration (Vot-min)	Design CO ₂ Concentration (Cs-design)	Outdoor Airflow at Design CO ₂ Concentration (Vot-design)
One-time field measurement	20% of Vot-design CFM = 960 CFM	Cs-min + X PPM = 1585 PPM	(Max OA CFM) = 4780 CFM

5. Outside air airflow setpoint shall reset the Supply fan VFD minimum speed setpoint, to assure adequate ventilation.
- Q. Pre-Occupancy Purge Cycle
1. Prior to entering the occupied mode, the unit shall operate for 30 minutes with the outside air damper open to deliver the design outdoor airflow rate.
 2. The supply fan shall operate continuously during the pre-occupancy purge cycle.
- R. Post-Occupancy Flush Cycle
1. Prior to entering the unoccupied mode, the unit shall operate with the outside air damper open to deliver the design outdoor airflow rate until the CO₂ concentration in the space is reduced to Minimum CO₂ Concentration (Cs-min) (field adjustable).
 2. The supply fan shall operate continuously during the post-occupancy flush cycle.
- S. Record Keeping
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.

END OF SECTION 230993

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 1 Specification Sections, apply to this Section.
- B. Section 230529 - Pipe Hangers and Supports
- C. Section 230555 - Mechanical System Identification
- D. Section 230700 - Pipe Insulation

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. SWP: Steam working pressure.
 - 7. TFE: Tetrafluoroethylene plastic.
 - 8. NPS: Nominal Pipe Size

1.04 SUBMITTALS

- 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.
- E. Shop Drawings
 - 1. 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.

2. 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.
3. 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.
4. Submit all layout shop drawings on not less than ¼ inch equals 1 foot scale drawings.

1.05 REFERENCES

- A. Division 1 - 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
- AB. ASTM A234/A234M - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- AC. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile
- AD. ASTM B32 - Solder Metal.
- AE. ASTM B42 - Seamless Copper Pipe.
- AF. ASTM B62 - Composition Bronze or Ounce Metal Castings
- AG. ASTM B75 - Seamless Copper Tube
- AH. ASTM B88 - Seamless Copper Water Tube.
- AI. ASTM B306 - Copper Drainage Tube (DWV).
- AJ. ASTM B584 - Copper Alloy Sand Castings for General Applications
- AK. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- AL. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
- AM. AWS A5.8 - Specification for Brazing Filler Material
- AN. AWWA C651 - Disinfecting Water Mains.
- AO. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.
- AP. NFPA 30 - Flammable and Combustible Liquids Code
- AQ. NFPA 54 - National Fuel Gas Code.
- AR. NSF 61 - Domestic Water Pipe, Valves, and Fittings.
- AS. Mechanical Code of New York State-Latest Edition
- AT. Plumbing Code of New York State-Latest Edition
- AU. Fuel Gas Code of New York State-Latest Edition
- AV. FM - Factory Mutual Compliance
- AW. 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
	2 ½ inches and larger	Schedule 40, seamless steel, ASTM A 53 Grade B	
Joints	2 inches and smaller	Lead-free solder, ASME B32; Water Soluble Flux, ASTM B-813	J.W. Harris-Bridgit
	2 ½ inches and larger	Welded Connections	

Item	Pipe Size	Description	Manufacturer/ Model No.
Fittings	2 inches and smaller	Cast copper alloy or wrought copper ASME B16.18 or ASME B16.22	Nibco
	2 ½ inches and larger	Standard Weight, Seamless steel, butt welded, ASTM A234	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
Check Valves	2 inches & smaller	Class 125, Y-pattern swing type, soldered connections, bronze body with TFE seat disc. MSS-SP80, ASTM B 62	Nibco S413-Y
	2 ½ inches & larger	Class 125, swing-type, flanged connections, cast iron body with bronze trim, non asbestos gasket. MSS-SP71, ASTM A-126 Class B	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

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 7 feet 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. Use fittings for all changes of direction. Bending of steel pipe is not permissible.
- H. Clean all piping materials before installation to remove grease, loose dirt, mill scale and other foreign matter.
- I. 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.
- J. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Provide loops, pipe offsets and anchors.
- K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- L. Install gate or ball valves for shut-off and to isolate equipment, parts of systems, or vertical risers.
- M. Sleeve pipes passing through partitions, walls and floors.
- N. Identify piping under provisions of "Mechanical System Identification" Specification.
- O. Provide escutcheons at all locations where piping installed exposed to view penetrates wall, partitions, floors and ceilings.
- P. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.
- Q. Install flexible connectors at inlet and discharge connections of pumps and other vibration producing equipment.
- R. Install strainers on the supply side of each control valve, pressure regulating valve, solenoid valve, trap, and elsewhere as indicated.
- S. 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.
- T. 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.

- U. 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
- V. For pressures over 15 psig, use nipples and caps instead of plugs for permanent closures. Plugs in equipment provided by equipment manufacturers are acceptable.
- W. Do not install piping above electrical panels. Route piping around panels.

3.02 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.

3.03 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.

3.04 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. Provide 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)
1/2"-3"	3	1
4"-12"	5	2

- L. 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

3.05 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.

3.06 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. Natural gas piping; Maintain test pressure for a minimum of one hour but not less than ½ hour for each 500 cubic feet of pipe volume. After test, purge the entire system of test gas.
 - c. 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 all steam and condensate lines by blowing them out with live steam. Discharge steam and condensate from each main and branch safely to atmosphere for a minimum of five minutes.
 2. Clean all compressed air, instrument air, and fuel oil lines with oil-free dry compressed air at design pressure through each section so that they are blown free of dirt and debris.
 3. Clean domestic water lines by flushing with water until effluent is visibly as clean as the flushing medium.
 4. 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.
5. 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.
6. 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.
7. Following the Architect/Engineers 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)
Heating Hot Water Supply & Return	Hydrostatic		1.5 times maximum working pressure, but not less than 100 psi

3.07 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.

END OF SECTION 232000

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 and Hydronic Systems.

1.03 REFERENCES

- A. ASHRAE - Handbook Fundamentals; Latest Edition.
- B. SMACNA - HVAC Duct Construction Standards Metal And Flexible (latest issue)
- C. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- D. ASTM B 209 - 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 and New York State Mechanical Code standards.

1.05 SUBMITTALS

- A. Ductwork shop drawings for approval:
 - 1. Coordinate layout duct drawings that differ from ductwork shown on the Drawings.
 - 2. 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.
 - 3. Deviations such as changing direction or transforming or dividing ductwork must maintain ductwork cross-sectional area and not exceed transformation taper of 15 degrees.
 - 4. Plans and section showing all equipment and accessories.

5. Minimum 3/8 in. scale, double line, showing sizes, transverse joints, transitions, elevations, clearances and accessories; sections where required.
- B. Shop details and catalog cuts of:
 1. Ductwork construction, including gauge and bracing schedule.
 2. Supports.
 3. Dampers.
 4. Turning vanes.
 5. Access doors.
 6. Flexible connections.
 7. Other accessories.

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 A 653.

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 single thickness Small Vane as detailed in SMACNA HVAC Duct Construction Standards Metal and Flexible.
- 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. Automatic dampers: linkage side.
 - 2. Smoke detection heads.
 - 3. On both sides of ducts where necessary to provide maintenance accessibility to equipment on either side.
 - 4. Fan Plenums.
 - 5. 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 than 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 6 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. Where rod lengths exceed 30 inches, provide regulator at both ends.
- 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 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 4 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.

2.10 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

2.11 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.

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 not 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 $\pm 1/8"$.
- 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 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	

- G. Total system leakage shall not exceed 10 percent of the scheduled design capacity of the system when tested as per SMACNA testing methods.

3.08 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.

3.09 DUCTWORK MATERIAL SCHEDULE

AIR SYSTEM	DUCTWORK MATERIAL
Supply, Outside Air & Exhaust Ductwork	Galvanized Steel

END OF SECTION 233113

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide exhaust fans, as specified herein, of sizes and capacities scheduled and in locations shown on drawings.

1.02 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.

1.03 SUBMITTALS

- A. Shop 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.

1.04 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. 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 CEILING EXHAUST FANS

- A. Ceiling mounted exhaust fans shall be of the centrifugal direct drive type. The fan housing shall be constructed of heavy gauge galvanized steel. The housing interior shall be lined with 0.5 in. acoustical insulation. The outlet duct collar shall include an aluminum backdraft damper and shall be adaptable for horizontal or vertical discharge.
- B. The grille shall be constructed of high impact polystyrene. Grilles shall be non-yellowing.
- C. The access for wiring shall be external. The motor disconnect shall be internal and of the plug in type. The motor shall be mounted on vibration isolators. The fan wheel(s) shall be of the forward curved centrifugal type, constructed of galvanized steel and dynamically balanced.
- D. All fans shall be licensed to bear the AMCA Certified Ratings Seals for sound and air performance and shall be U.L. Listed and C.S.A. approved.
- E. Ceiling exhaust fans shall be Model SP as 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 fans are properly interlocked with supply fans and with control system.
- D. Demonstrate operation to Owner and instruct maintenance personnel in operation of equipment.

END OF SECTION 233416

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. 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. Round Ceiling Diffusers:
 1. Furnish and install round 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. Round, stamped or spun, multi-core diffuser to discharge air in 360 degree pattern, with sectorizing baffles where indicated. Size diffuser collar to project not more than one inch above ceiling.
 4. Provide a radial opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.
 5. Manufacture diffusers with trim to allow for recessed mounting into ceiling grids or for surface mount in other ceiling types.
 6. Manufacturer: TITUS Model Series TMRA 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. 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-O or approved equal.
- F. Coordinate color with Owner.

2.03 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 $\frac{3}{4}$ " 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.

2.04 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.

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. 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 233713

PART 1 - GENERAL

1.01 RELATED SECTIONS

- A. Section 233113 - Sheet Metal Work.
- B. Division 26.

1.02 SUBMITTALS

- A. Shop Drawings: Submit drawings for each size of factory fabricated roof curb.
- B. Product Data: Manufacturer's catalog sheets, brochures, performance charts, standard schematic drawings, specifications and installation instructions for each size unit.
- C. Contract Closeout Submittals - Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director's Representative.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Unit shall be factory tested and the design, construction and installation shall be in accordance with the following: ARI Standard 210, NFPA, UL, ASHRAE 15, Safety Code for Mechanical Refrigeration, and all State and Local codes or regulations having jurisdiction.
 - 2. Unit shall be listed by ETL as a total package.
 - 3. Unit shall be rated in accordance with AHRI Standard 210/240 and 340/360.
 - 4. Electrical components shall be UL listed.
 - 5. Roof curb shall be designed to NRCA criteria per Bulletin B-1986.
 - 6. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
 - 7. Unit shall meet ASHRAE 90.1 minimum efficiency requirements.
 - 8. 3 phase units shall be Energy Star certified.

1.04 PRODUCT DELIVERY

- A. Deliver each unit as an integral factory packaged assembly.
- B. Unit shall be stored and handled per manufacturer's recommendations.
- C. Unit shall only be stored or positioned in the upright position.

1.05 MAINTENANCE

- A. Maintenance Service: A fully equipped authorized service organization capable of guaranteeing response within 8 hours to service calls shall be available 24 hours a day, 7 days a week to service the completed Work.
- B. Extra Materials: Provide with each unit, one spare set of air filters. Suitable box and label spare filters as to their usage.

PART 2 - PRODUCTS

2.01 ELECTRIC COOLING PACKAGED ROOFTOP UNITS

- A. General

1. Units shall be manufactured in an ISO 9001 certified facility.
- B. Description
1. Units shall be factory assembled, single package, designed for outdoor installation. They shall have built in field convertible duct connections for down discharge supply/return or horizontal discharge supply/return and be available with factory installed options or field installed accessories. The units shall be factory wired, piped and charged with R-410A refrigerant and factory tested prior to shipment. All unit wiring shall be both numbered and color coded. The cooling performance shall be rated in accordance with DOE and AHRI test procedures. Units shall be CSA certified to ANSI Z21.47 and UL 1995/CAN/CSA No. 236-M90 standards.
- C. Unit Cabinet
1. Unit cabinet shall be constructed of galvanized steel with exterior surfaces coated with a non-chalking, powder paint finish, certified at 1000 hour salt spray test per ASTM-B117 standards. Indoor blower sections shall be insulated with up to 1" thick insulation coated on the airside. Either aluminum foil faced or elastomeric rubber insulation shall be used in the unit's compartments and be fastened to prevent insulation from entering the air stream. Cabinet doors shall be hinged with toolless access for easy servicing and maintenance. Full perimeter base rails shall be provided to assure reliable transit of equipment, overhead rigging, fork truck access and proper sealing on roof curb applications. Disposable 2" filters shall be furnished as standard and be accessible through hinged access door. Fan performance measuring ports shall be provided on the outside of the cabinet to allow accurate air measurements of evaporator fan performance without removing panels or creating bypass of the coils. Condensate pan shall be slide out design, constructed of a non corrosive material, internally sloped and conforming to ASHRAE 62-B9 standards. Condensate connection shall be a minimum of 3/4" I.D. female and be rigid mount connection.
- D. Outdoor (Condenser) Fan Assembly
1. The outdoor fans shall be of the direct drive type, discharge air vertically, have aluminum blades riveted to corrosion resistant steel spider brackets and shall be dynamically balanced for smooth operation. The outdoor fan motors shall have permanently lubricated bearings internally protected against overload conditions and staged independently. A cleaning window shall be provided on two sides of the units for coil cleaning.
- E. Refrigerant Components
1. Compressors:
 - a. Shall be fully hermetic type, direct drive, internally protected with internal high-pressure relief and over temperature protection. The hermetic motor shall be suction gas cooled and have a voltage range of + or - 10% of the unit nameplate voltage.
 - b. Shall have internal spring isolation and sound muffling to minimize vibration and noise, and be externally isolated on a dedicated, independent mounting.
 2. Coils:
 - a. Evaporator coils shall have aluminum plate fins mechanically bonded to seamless internally enhanced copper tubes with all joints brazed. Special Phenolic coating shall be available as a factory option.
 - b. Evaporator coils shall be of the direct expansion, draw-thru design.
 - c. Condenser coils shall have aluminum plate fins mechanically bonded to seamless internally enhanced copper tubes with all joints brazed or Micro-Channel aluminum tube, aluminum fins. Special Phenolic coating shall be available as a factory option.
 - d. Condenser coils shall be of the draw-thru design.
 3. Refrigerant Circuit and Refrigerant Safety Components shall include:
 - a. Independent fixed-orifice or thermally operated expansion devices.
 - b. Solid core filter drier/strainer to eliminate any moisture or foreign matter.

- c. Accessible service gage connections on both suction and discharge lines to charge, evacuate, and measure refrigerant pressure during any necessary servicing or troubleshooting, without losing charge.
 - d. The 6-1/2 through 12-1/2 ton unit shall have two independent refrigerant circuits, equally split in 50% capacity increments.
- 4. Unit Controls:
 - a. Unit shall be complete with self-contained low-voltage control circuit protected by a resettable circuit breaker on the 24-volt transformer side.
 - b. Unit shall incorporate a lockout circuit which provides reset capability at the space thermostat or base unit should any of the following standard safety devices trip and shut off compressor:
 - 1) Loss-of-charge/Low-pressure switch.
 - 2) High-pressure switch.
 - 3) Freeze-protection thermostat, evaporator coil. If any of the above safety devices trip, an LED (light-emitting diode) indicator shall flash a diagnostic code that indicates which safety switch has tripped.
 - c. Unit shall incorporate "AUTO RESET" compressor over temperature, over current protection.
 - d. Unit shall operate with conventional thermostat designs and have a low voltage terminal strip for easy hook-up.
 - e. Unit control board shall have on-board diagnostics and fault code display.
 - f. Standard controls shall include anti-short cycle and low voltage protection, and permit cooling operation down to 0 °F.
 - g. Control board shall monitor each refrigerant safety switch independently.
 - h. Control board shall retain last 5 fault codes in non-volatile memory, which will not be lost in the event of a power loss.
- F. Unit Operating Characteristics
 - 1. 1. Unit shall be capable of starting and running at 125 °F outdoor temperature, exceeding maximum load criteria of AHRI Standard 340/360. The compressor, with standard controls, shall be capable of operation down to 0 °F outdoor temperature. Unit shall be provided with fan time delay to prevent cold air delivery before heat exchanger warms up. (Gas heat only)
- G. Electrical Requirements
 - 1. All unit power wiring shall enter unit cabinet at a single factory provided location and be capable of side or bottom entry to minimize roof penetrations and avoid unit field modifications. Separate side and bottom openings shall be provided for the control wiring.
- H. Standard Limited Warranties
 - 1. Compressor - 5 Years, Heat Exchanger - 10 Years, Stainless Steel Heat Exchanger - 15 Years, Elect. Heat Elem. - 5 Years, Parts - 1 Year.
- I. Factory Installed Options:
 - 1. Electronic Enthalpy Automatic Economizer - Outdoor and return air dampers that are interlocked and positioned by a fully-modulating, spring-return damper actuator. The maximum leakage rate for the outdoor air intake dampers shall not exceed 2% when dampers are fully closed and operating against a pressure differential of 0.5 IWG. A unit-mounted potentiometer shall be provided to adjust the outdoor and return air damper assembly to take in outdoor air to meet the minimum ventilation requirement of the conditioned space during normal operation. During economizer operation, a mixed-air temperature control shall modulate the outdoor and return air damper assembly to prevent the supply air temperature from dropping below 55 °F. Changeover from compressor to economizer operation shall be provided by an integral electronic enthalpy control that feeds input into the basic module. The outdoor intake opening shall be covered with a rain hood that matches the exterior of the unit. Water eliminator/filters shall be provided.

Simultaneous economizer/compressor operation is also possible. Dampers shall fully close on power loss. Available with barometric relief or power exhaust.

2. Powered Convenience Outlet - Unit is provided with an internally powered 120VAC GFCI outlet with cover on the corner of the unit housing the compressors.
3. Coil Guard - Designed to prevent condenser coil damage
4. BAS Controls - Include supply air sensor, return air sensor, dirty filter indicator and air proving switch
5. Refer to sheet MA-600 for complete list of accessories / options

PART 3 - EXECUTION

3.01 INSTALLATION

- A. 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.
- B. Air Conditioners:
 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.

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 State 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 State Personnel in the operation and maintenance of the air conditioner and accessories.

END OF SECTION 238100

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Unit Heaters.

1.02 RELATED SECTIONS

- A. Section 232007 - Piping Specialties
- B. Section 232001 - Pipes, Valves and Fittings
- C. Section 230993 - Sequence of Operations
- D. Section 230594 - Balancing of Systems

1.03 SUBMITTALS

- A. Product Data
- B. Submit manufacturer's catalog sheets, brochures, performance charts, specifications and installation instructions.
- C. Maintenance Data
- D. Submit maintenance instructions and spare parts lists. Include this data, product data, shop drawings and schedule in maintenance manuals in accordance with Division 1.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Qualifications
- B. Firms regularly engaged in manufacture of unit heaters, of types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Unit heaters shall be shipped from the factory in suitable protective covering. Store unit heaters and components in clean dry place. Protect from weather, fumes, water, construction debris, and physical damage.

PART 2 - PRODUCTS

2.01 CABINET UNIT HEATER (CUH-1)

- A. Unit heater shall consist of an enclosed, extended-surface heating element with propeller-type fan, with capacity and electrical characteristics as shown on the drawings. The entire unit and controls shall be UL-labeled. Heater shall be mounted with threaded rod, unless directed otherwise by manufacturer, and be suitable for mounting with horizontal air discharge.
- B. Hot Water Coil: Extended surface type, utilizing aluminum fins and DLP-type copper tubes with cast bronze supply and return connections. Coils shall be of serpentine design with horizontal tubes, vertical fins, and center supply and return connections. All tube bends shall be brazed. Tubes shall be mechanically bonded to the collars of the fins. Coils shall be capable of operating at hot water pressures and temperatures of 150 psig and 375 deg F.

- C. Fan: Direct drive propeller type, statically and dynamically balanced, with fan guard/motor mounting bracket; horizontal models with permanently lubricated sleeve bearings. Aluminum construction secured to a steel hub.
- D. Cabinet shall be minimum 20 gauge steel treated to prevent corrosion and painted with a corrosion resistant, high solids gray-green finish. Casing top shall be provided with threaded rod connections for hanger rods, except models to be directly mounted to the supply and return piping as suggested by the manufacturer. Provide horizontal and vertical louvers on the discharge for direction of the air.

2.02 CONTROLS

- A. Controls shall consist of a wall-mounted, line voltage thermostat, with protective cover and lock. See section 230993 for sequence of operation.

2.03 ACCESSORIES REQUIRED (PROPELLER TYPE)

- A. Accessories required are as follows:
 - 1. Thermostats as required. Some thermostats will control (multiple) unit heaters. Refer to the contract drawings for the required number of thermostats.
 - 2. Galvanized Support brackets.

2.04 ACCEPTABLE MANUFACTURERS

- A. Unit heater shall be the make and model number shown on the drawings or equivalent products by:
 - 1. Sterling
 - 2. Approved Equal

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install unit heaters using threaded rod, sized according to unit tapings. Secure to structural support as required.
- B. Install the unit heaters in the locations shown on the contract drawings.
- C. Make electrical connections for power and controls as required by code. Refer to the Sequence of Operation in Section 230993.
- D. Check the unit heater for proper operation, including safety controls.

END OF SECTION 238239.12

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.

1.02 RELATED WORK

- A. Field painting, except such painting as is required to maintain shop coat painting and factory finish painting.
- B. Flashing and sealing of conduits through outside walls.
- C. Cutting and patching for electrical work, except for errors and omissions under this Division.

1.03 QUALITY ASSURANCE

- A. It is understood that the rights and benefits given the Owner by the guarantees found in the technical specifications are in addition to and not in derogation of any rights or benefits found in the special and general provisions of the contract.
- B. Electrical equipment provided under this Division shall be turned over in operating condition. Instruction on further operation and maintenance shall be included in the operating and maintenance instructions.

1.04 REFERENCES

- A. Perform work in accordance with standards listed below. Where these specifications are more stringent, they take precedence. In case of conflict, obtain a decision from the Engineer.
 - 1. UCS: 2016 Uniform Code Supplement
 - 2. IBC: International Building Code 2018
 - 3. IFC: International Fire Code 2018
 - 4. IMC: International Mechanical Code 2018
 - 5. IPC: International Plumbing Code 2018
 - 6. IGC: International Fuel Gas Code 2018
 - 7. IEBC: International Existing Building Code 2018
 - 8. ECCC: 2016 Supplement to the New York State Energy Conservation Construction Code
 - 9. MPS: Manual of Planning Standards (1998)
 - 10. 155: 8 NYCRR 155 Regulations of the Commissioner of Education
 - 11. NFPA-70: National Electrical Code (2017)
 - 12. NFPA-101: Life Safety Code
 - 13. New York State Energy Code
 - 14. New York State Building Code
 - 15. Applicable New York State Administrative Code
 - 16. Applicable Town Ordinances.
 - 17. Electric utility rules and regulations.
 - 18. Telephone utility rules and regulations.

1.05 PERMITS AND FEES

- A. The Contractor shall obtain and pay for all permits, construction charges, fees, licenses, certificates, inspections and other use charges required in connection with the work.
- B. Such permits include, but are not limited to:
 - 1. Transportation and disposal of debris.
 - 2. Temporary Electrical Services and Permanent Electrical Service.
 - 3. Telephone Service.
 - 4. Electrical Inspectors, Inc., or a pre-approved electrical inspection agency.

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.
- B. Furnish Engineer with a copy of such tests including identification of each circuit and readings recorded, also the main service ground resistance test as described in Section 260526 of these specifications. Test information to include ampere readings of all panels and major circuit breakers, isolation resistance reading of motors and transformers.

3.04 IDENTIFICATION OF EQUIPMENT

- A. Properly identify the following:
 - 1. Distribution panels.
 - 2. Disconnect switches.
 - 3. Individually mounted circuit breakers.
- 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.

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 all Hasting on the Hudson Union Free School District.
- 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.(2014)
- 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.
- 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 ANACONDA, TRIANGLE, ROME, 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 6 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

208Y/120 Volt 3 phase (NEC)
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. (2014)
- B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS**2.01 COMPONENTS**

- A. Ground clamps: OZ ELECTRICAL MANUFACTURING COMPANY, Type "CG", 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.

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. (2017)

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 shall be 1-1/2" x 1-1/2".
- C. Channels and all associated accessories and bolts shall be hot dipped galvanized.
- D. Channels shall have 9/16" bolt holes on 1-1/2" centers.
- E. 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 permit-ted.
- 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.
 - 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. Surface mounted raceway (Wiremold)
 - a. For use in finished areas on block walls and plaster walls, only.
 - 6. J-Hooks
 - a. For use above finished ceilings for telephone, PA, 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. (2017)
- 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.

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.

2.04 SURFACE MOUNTED RACEWAY (WIREMOLD)

- A. Manufacturer: Wire Mold shall be manufactured by LEGRAND or approved equal.
- B. Model: 700 Series - One-Piece Steel Surface Raceway.
- C. Paint wire mold to match existing wall color.
- D. UL5 and ADA compliant.
- E. UL and cUL Listed.

2.05 J-HOOKS

- A. TO BE USED ABOVE FINISHED CEILING ONLY. FOR TELEPHONE, PA, CAT 6 DATA AND FIRE ALARM CABLE ONLY. ALL EXPOSED TELEPHONE, PA, 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.

2.06 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.

2.07 OUTLET AND DEVICE BOXES

- A. Acceptable Manufacturers: Raco, General Electric or approved equal.
- B. Sheet Metal Outlet Boxes - All concealed boxes shall be NEMA OS1, 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 fer alloy. Provide gasketed cover by box manufacturer.

2.08 JUNCTION BOXES

- A. Acceptable Manufacturers: RACO, GENERAL ELECTRIC or approved equal.
- B. Sheet metal boxes: NEMA OS1, galvanized steel.
- C. Covers: Galvanized steel.

2.09 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.

2.10 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. Conduit joints shall be cut square, threaded, reamed smooth, and drawn up tight so conduit ends will butt in couplings, connectors and fittings.
- C. All threaded conduits and fittings shall have KOPR-SHIELD compound applied to all threads prior to assembly.
- D. Make bends or offsets with standard ells or field bends with an approved bender.
- E. 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.
- F. Secure conduits to all boxes and cabinets with double locknuts and bushings so system will be electrically continuous from service to all outlets.
- G. Install conduit in accordance with NECA Standard of Installation.
- H. Cap ends of conduits to prevent entrance of water and other foreign material during construction.
- I. Complete all conduit systems before pulling conductors.
- J. Support conduits under provisions of Section 260529.
- K. Provide approved expansion joints or fittings and bonding jumpers where conduits in concrete pass through building expansion joints.
- L. Provide cable supports in conduits rising vertically in accordance with the National Electric Code, Article 300-19.
- M. Provide No. 12 AWG copper pull wires or nylon cord in all empty conduits. Steel wire not acceptable as pull wire.
- N. Install conduit to preserve fire resistance rating of partitions and other elements.
- O. Ground and bond conduit under provisions of Section 260526.
- P. Where neither length of conduit can be rotated, ERICKSON couplings Series 676 shall be used.
- Q. 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.
- R. In concrete slabs block up conduit from forms and securely fasten in place. All conduits in slabs shall be installed below concrete slab.
- S. 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.

- T. 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.
- U. Arrange supports to prevent misalignment during wiring installation.
- V. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- W. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- X. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- Y. Do not attach conduit to ceiling support wires.
- Z. Arrange conduit to maintain headroom and present neat appearance.
- AA. Route exposed conduit parallel and perpendicular to walls.
- AB. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- AC. Route conduit in and under slab from point-to-point.
- AD. Do not cross conduits in slab.
- AE. Maintain adequate clearance between conduit and piping.
- AF. Maintain 12-inch clearance between conduit and surfaces with temperatures exceeding 104°F (40°C).
- AG. Bring conduit to shoulder of fittings; fasten securely.
- AH. Use conduit hubs with sealing locknuts to fasten conduit in damp and wet locations.
- AI. 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.
- AJ. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- AK. Do not use dissimilar strap or clamp supports. Provide dielectric tape, fittings, straps, and bushings where dissimilar metals are used.
- AL. 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.
- AM. 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.

- AN. Install a copper jumper across all flexible conduit including lighting fixtures, controls and other utilization equipment.
- AO. Install liquid-tight flexible conduit in such a manner as to prevent liquids from running on surface toward fittings.
- AP. Allow sufficient slack conduit to reduce the effect of vibration.
- AQ. Complete all conduit systems before pulling the conductors.
- AR. 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. Where required to hang a specific fixture, provide a fixture stud of the no-bolt, self-locking type on ceiling outlets.
- F. 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.
- G. 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.
- H. 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.
- I. 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.
- J. Use boxes of sufficient cubic capacity to accommodate the number of conductors to be installed, in accordance with the National Electric Code.
- K. Effectively close unused openings in boxes with metal plugs or plates.
- L. Set boxes so that front edges are flush with finished surfaces.
- M. Support boxes from structural members with approved braces.
- N. Install blank device plates on outlet boxes left for future use.
- O. Provide bushings in holes through which cords or conductors pass.

- P. Install boxes so that the covers will be accessible at all times.
- Q. 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.

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 electrical and mechanical 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 and wiremold shall be primed and painted to match existing adjacent wall color.
- E. J-Hooks are only permitted to be used above finished ceilings for telephone, PA, 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. ANSI/NFPA 70 - National Electrical Code. (2014)

1.03 SUBMITTALS

- A. Submit under provisions of Section 013300.
- 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 ANSI/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. All control switches and pilot light devices.
- 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.

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. Switches, device plates and other wiring devices as indicated on Drawings.

1.02 REFERENCES

- A. ANSI/NFPA 70 - National Electric Code. (2014)
- B. NEMA WD1 - General Purpose Wiring Devices.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Provide manufacturer's catalog information showing dimensions, colors and configuration.

1.04 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, LEGRAND, 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, LEGRAND, 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.

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 TELEPHONE/DATA OUTLETS

- A. Provide combination telephone/data jacks compatible with RJ-45 and RJ-11 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.
- E. Provide new SO cord for all chemical pumps and install plug end to match receptacle.

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 - LIGHTING & DIMMING

1.01 WORK INCLUDED

- A. The Electrical Contractor, as part of the work of this section, shall provide, install and test a complete lighting control system as specified herein for areas indicated on the drawings and circuit schedules.
- B. The Electrical Contractor shall hire a Theatrical Systems Integrator as described below.
- C. The Electrical Contractor shall furnish all conduit, wire, connectors, hardware and other incidental items necessary for the complete and proper operation of the lighting control system.
- D. The Electrical Contractor shall coordinate all work described in this section with all other applicable plans and specifications, including but not limited to:
 - 1. General Conditions
 - 2. Electrical Section General Provisions
 - 3. Conduit
 - 4. Wire and Cable
- E. All rigging equipment and detailed design shall be submitted to the architect for review. All drawings, schedules, and details shall be reviewed and stamped by a NY Stamp Licensed Professional Engineer. The costs for this shall be included in base bid.

1.02 SYSTEM DESCRIPTION

- A. The system shall be designed for the control of architectural and theatrical lighting and shall consist of factory pre-wired dimming and processing rack enclosures containing dimmers, relays, power supplies, breakers, terminals and/or control electronics.
- B. System shall work in conjunction with specified low-voltage control stations.

1.03 SUBMITTALS

- A. Manufacturer shall provide 2 sets of full system submittals. Submittals shall include:
 - 1. Full system riser diagram(s) illustrating interconnection of system components, wiring requirements, back box sizes and any special installation considerations.
 - 2. Full set of printed technical data sheets.
 - 3. Detailed set of dimmer schedules
 - 4. Detailed set of circuit and control schedules, including a complete list of all deviations from specifications.
- B. Manufacturer shall provide any additional information, including equipment demonstrations, as required by the engineer or specifier to verify compliance with specifications.

1.04 QUALITY ASSURANCE

- A. Manufacturer shall be one who has been continuously engaged in the manufacturer of lighting control equipment for a minimum of ten years. All dimmer and cabinet fabrication must take place in a U.S. manufacturing plant.
- B. The manufacturer shall have a factory authorized stocking service center with at least one full time service technician on staff located within 150 miles of the job site. In addition, the manufacturer shall have a toll free 24-hour hotline with a maximum response time of 20 minutes, 24 hours a day and 365 days a year.

- C. All equipment, where applicable standards have been established, shall be built to the standards of Underwriters Laboratories, Inc., the National Electric Code and the United States Institute for Theater Technology. Permanently installed power distribution equipment such as dimmer racks and distribution shall be UL and C-UL Listed, and/or CE marked (where applicable) and bear the appropriate labels. Portable equipment such as consoles and fixtures shall be UL and C-UL Listed, ETL Listed and/or CE marked (where applicable) and bear the appropriate labels.

1.05 ACCEPTABLE MANUFACTURERS

- A. The equipment herein specified shall be manufactured (Alphabetical order) by:
 - 1. ADC, 2121 South 12th Street, Allentown, PA 18103. Phone: 610-797-6000 Fax: 610-797-4088
 - 2. Altman Lighting, 57 Alexander Street, Yonkers, NY 10701. Phone: 914-476-7987
 - 3. Aquarii, Inc., 17 Genesee Street, Camillus, NY 13031.
 - 4. CANTO USA, 1092 West Atlanta Street, SE, Suite 300, Marietta, GA 30060. Phone: 888-252-5912
 - 5. Electronic Theatre Controls, Inc., PO Box 620979, Middleton, WI 53562. Phone: 608-831-4116 Fax: 608-836-1736
 - 6. Pathway Connectivity, Acuity Brands Lighting Canada, #103 - 1439 17th Avenue SE, Calgary AB T2G 1J9, Canada. Phone: 403 243 8110 Fax: 403 287 1281
 - 7. Stage Decoration & Supplies, Inc., 3519 Associate Drive, Greensboro, NC 27405. Phone: 336-621-5454 Fax: 336-621-5484
 - 8. SSRC Inc., 170 Fortis Drive, Duncan SC 29334. Phone: 864-848-9770 Fax: 964-848-3746
- B. Alternative manufacturers must submit a full pre-approval package ten days prior to bid date. Package shall consist of items listed in Article I, Section 1.03A.
- C. Permission to bid does not imply acceptance of the manufacturer. It is the sole responsibility of the Electrical Contractor to ensure that any price quotations received and submittals made are for controls systems that meet or exceed the specifications.

1.06 THEATRICAL SYSTEMS INTEGRATOR

- A. The Electrical Contractor shall hire a Theatrical Systems Integrator. The provider of the system herein described shall be acknowledged in business as a Theatrical Systems Integrator (herein referred to as "TSI"). The role of the TSI in this project shall be to provide all equipment listed in this section to the Electrical Contractor for installation. The TSI shall furnish a complete working system to the Electrical Contractor, meeting the intent of this specification. 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.
- B. 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.
- C. The TSI shall have been in business for a minimum of 15 consecutive years and shall have no history of bankruptcy.
- D. The TSI shall be an authorized dealer for an adequate number of manufacturers of system products necessary to provide a complete working system meeting the intent of this specification. System products shall include but are not limited to the following:
 - 1. Dimming / Relay Equipment
 - 2. Control System

3. Lighting Fixtures
 4. Power Distribution
 5. Stage Accessories
 6. Stage Tracks and Draperies
 7. Deadhung Rigging pipes and Motorized Stage rigging
- E. The TSI shall be located within 50 miles of the job-site.
- F. The TSI shall have on staff at least two full-time manufacturer-certified field service technicians and have technical support and assistance accessible 24 hours a day, seven days a week.
- G. The TSI shall offer a Maintenance and Service Contract.
- H. The TSI shall provide a one-year system warranty for the complete system, not including expendable supplies, effective from the date of system acceptance. Within this warranty period, the TSI shall be responsible as the Owner's sole contact for the remedy, repair, or replacement of system deficiencies (through the manufacturer's warranty where applicable).
- I. Approved Theatrical Systems Integration Companies Shall Be:
1. Barbizon Electric, 456 W. 55th Street, New York, NY 10019. Phone: (212) 586-1620 Fax: (212) 586-6935 - Eric Delhauer
 2. Or approved equal company that can meet or exceed the requirements of the specified equipment and installation.

PART 2 - GENERAL REQUIREMENTS

2.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

2.02 GOVERNING CLAUSE

- A. For the sake of brevity, these specifications shall omit phrases such as "Contractor shall furnish and install", "unless otherwise indicated or specified", etc., but these phrases are nevertheless implied. Mention of materials and operations requires the Contractor to furnish and install such materials and perform such operations completely to the satisfaction of the owner's representative.

2.03 SCOPE OF WORK

- A. One company shall be responsible for the installation of all aspects of the stage rigging equipment. Work under this section shall include furnishing all labor, materials, tools, transportation services, supervision, etc., necessary to complete installation of the stage rigging equipment as well as any other items as herein listed, all as described in these specifications, as illustrated on the accompanying drawings; or as directed by the Owner's Representative. Work included is as per specifications and drawings.

2.04 SUBSTITUTIONS:

- A. Specific items of equipment are specified by trade names. It has been determined by the systems designer that these are the particular items desired by the Owner and establish a standard of quality, equipment function and/or process. It is not the purpose or intent of these documents to eliminate competitive bids. In order to allow proper and fair comparison of pricing, contractors are required to submit their base bid price on the specified equipment. A contractor may submit an alternate bid based on equipment different from that specified only if that

Contractor has received prior approval in writing from the Architect at least 10 days prior to bid. Accompanying each request shall be a letter specifically detailing each substitution including catalog data, specifications, operative samples, technical information, drawings, performance and test data, and complete descriptive and functional information to assist in a fair evaluation. Failure to submit any substitution for prior approval or not providing sufficient data for evaluation shall require the exact item specified to be furnished. Architect's approval of a substitution for bid purposes will not relieve the contractor from the responsibility of meeting all specification criteria. If an approval of a substitution is granted, the Contractor shall be fully responsible for any and all changes (wiring, power, distribution, support structure, etc.) such substitution shall require.

2.05 DEFECTIVE OR NON-APPROVED MATERIALS

- A. Should any equipment be found defective, not meeting specifications, or that which has not been approved in writing by the Architect shall, upon discovery (including any time within the period of the guarantee), be replaced with the specified equipment or material at no additional cost.

2.06 GUARANTEE

- A. The Contractor shall guarantee all of the work that is performed under this contract, including all materials, and workmanship, for a period of three (3) years from the date of full acceptance of the work in accordance with the following conditions.
- B. Warranty shall be in effect on materials and equipment for three years from the date of system commissioning under the following conditions:
 - 1. Maintaining the warranty in effect requires annual inspection of the system by a factory trained and certified contractor. Continuing annual inspection is strongly encouraged.
 - 2. The three year warranty is contingent upon annual inspection at the end of the first and second years of service. The end user is responsible for making arrangements for each inspection with the contractor identified on the Motor Controller or a factory certified inspector/installer.
 - 3. In the event annual inspection is not requested and performed at the end of the first or second year of service, the warranty shall become void at the end of that year of service.
 - 4. Each warranty inspection report must be sent to the factory by the inspecting contractor within 10 days of completing the inspection.
- C. Nothing in this guarantee shall cause repair or replacement by the Contractor where negligence, neglect or improper operation by the Owner has caused the failure of any equipment installed under this contract.

2.07 DISCREPANCIES

- A. All equipment shall be sized to fit properly. The exact measurements are the responsibility of the Contractor. If there are discrepancies in the specifications, the Contractor shall ask for a clarification from the Architect. If no clarification is requested, the Architect's judgment shall rule.

2.08 THEATRICAL SYSTEMS INTEGRATOR

- A. The Contractor shall utilize the Theatrical Systems Integrator (herein referred to as "TSI") to coordinate and assist in the installation of all aspects of the motorized rigging equipment as specified in this section. This shall include but not be limited to all motorized rigging and miscellaneous equipment.
- B. In order to be considered as the TSI on this project, each Contractor requesting approval must submit to the Architect at least ten (10) days prior to the date of bid opening a letter expressing

his intent to bid. This letter shall include a list of at least five (5) projects of similar size and scope completed by this firm within the last five (5) years. Inspection of one completed installation may be requested by the Architect/Engineer's Representative prior to consideration of request to bid. the TSI shall have been in business under the same name for five (5) full years preceding the date of this bid doing work similar to the type specified. ETCP certification in theatre rigging is required by the lead installer or project manager of the TSI to receive approval to bid. Verification of this certification must be provided to be considered for approval. The decision of the Architect as to the capability of the Bidder to successfully complete and maintain the system based on this pre-qualification information shall be final.

- C. Pre-Bid request letter shall include a statement that all major items of equipment shall be bid and supplied as specified, or shall contain details of all proposed substitute equipment for review by the Architect/Engineer's Representative. Substitute equipment items to include specifications, parts numbers, and details of interconnection to proposed system. The decision of the Architect as to the acceptability of substitute equipment shall be final.
- D. The TSI shall employ only fully trained stage riggers and mechanics, for the erection of the stage equipment. The stage riggers shall be completely familiar with the type of equipment to be installed. A competent job superintendent shall be on the job at all times when work is in progress. The job superintendent must be ETCP certified in theatre rigging. A copy of the certification must be furnished to the General Contractor prior to the start of the installation.

2.09 DOCUMENTATION

- A. **SHOP DRAWINGS:** Shop drawings and equipment data sheets shall be submitted to the Architect under general provisions within 45 days after award of the contract. Failure to comply with this 45 day requirement shall be cause for disqualification of the selected Contractor and cancellation of contract without cost to the owner, on the basis that the selected Contractor does not have the ability or intention to comply with the specifications. Approval of submitted equipment shall be obtained prior to equipment purchase or fabrication. If shop drawings are rejected, correct and resubmit in the manner specified. All shop drawing information shall be submitted at the same time; no partial submittal shall be accepted. Drawings shall indicate complete details, dimensions, product types and locations of all equipment, clearances required, guides, cables, sets, Contractor fabricated equipment, and all other details required to completely describe the work to be performed. Submittals drawings shall be presented at a scale not less than 1/4" for equipment layouts and 1/2" = 1'-0" for equipment details, mounting and other details. Each sheet shall allow space for approval stamps and have the name of the project, the Contractors and/or the supplier's name, address telephone number, and the date submitted. Submit the following items for Architect's approval, prior to fabrication:
 - 1. Stage plan view
 - 2. Stage side section view
 - 3. Gridiron layout indicating all stage equipment - stamped by Professional Engineer.
 - 4. Electrical riser diagrams indicating the necessary power and control wiring for all rigging equipment and systems
 - 5. Plan and elevation views indicating all power, motor and control hardware locations and layout
 - 6. Provide full dimensions for panel layouts with finishes and materials for all custom panels
 - 7. Details of installation and erection, including adjoining conditions and necessary clearances - **stamped by NY State Professional Engineer.**
 - 8. Indication by arrow and boxed caption of each variation from contract drawing and specifications, except those indicated as acceptable in specifications or on drawings
- B. **RECORD DRAWINGS AND DATA:** Submit in accordance with General Provisions. Within 30 days of final test and completion of the installation, submit the following to the Architect:

1. Three (3) complete sets of "as built and approved" drawings showing systems and elements as installed, including field modifications and adjustments - **stamped by NY State Professional Engineer.**
 2. Three (3) sets of maintenance data including a list indicating replacement parts lists for all items of equipment, wiring diagrams, control diagrams, any and all keys for cabinets, racks, key operated switches etc. and complete operation manuals.
 3. Three (3) Certificates of Guarantee
- C. INSTRUCTION OF OWNER PERSONNEL: This contractor or his/her representative, fully knowledgeable and qualified in systems operation, shall provide four (4) hours of instruction to the Owner-designated personnel on the use and operation of this System. Designated instruction times shall be arranged through the Architect.
- D. PERMITS: Obtain all permits necessary for the execution of any work pertaining to the installation, and conform in all trades with all applicable local codes and national codes. Obtain all permits necessary for operation of any equipment by the Owner.
- E. CLEAN UP: It shall be the responsibility of this Contractor to remove all debris from the building or site caused by his operations to a common trash point or receptacle on the job site, as determined by the General Contractor.
- F. NY State Professional Engineer Stamp - The contractor shall have all rigging plans including submittals and as-built drawings stamped by a NY State Professional Engineer. All fees shall be included in base bid.

PART 3 - PRODUCTS

ITEM	MANUFACTURER AND MODEL	QUANTITY
RUSH BATTEN 1 HEX	MARTIN-90480160	FIFTEEN (15)
ELLIPSOIDAL WARM WHITE	MARTIN-9045107781	EIGHT (8)
ELLIPSOIDAL 26 DEGREE LENS TUBE	MARTIN-9045107783	EIGHT (8)
DMX 5.3 SPLITTER	MARTIN-90758140	ONE (1)
DUAL 20A CONSTANT VOLTAGE MODULE	ETC CC20	FOUR (4)
CONSOLE WITH 2 DISPLAYS 2+20 FADERS	ETC IONXE 20	ONE (1)
CUESERVER 2 PRO LIGHTING CONTROL	INTERACTIVE TECH CS-900	ONE (1)
ALUMINIUM CHESEBORO (PRO BURGERS)	MH HR2019A	ONE (1)
BLACK SAFETY CABLE - 30 INCHES	SLS	FIFTEEN (15)
DMX 5 PIN LIGHTING CABLE 50FT	PROCO-DMX5-50	FOUR (4)
DMX 5 PIN LIGHTING CABLE 15FT	PROCO-DMX5-15	THIRTY-TWO (32)
PWRCON/20F-10	RHC-PWRCON/20F-10	THIRTY-TWO (32)
PWRCON/20F-25	RHC-PWRCON/20F-25	FOUR (4)
PWRCON/20F-50	RHC-PWRCON/20F-50	FOUR (4)

PART 4 - EXECUTION

4.01 INSTALLATION

- A. It shall be the responsibility of the Electrical Contractor to receive and store the necessary materials and equipment for installation of the dimmer system. It is the intent of these specifications and plans to include everything required for proper and complete installation and operation of the dimming system, even though every item may not be specifically mentioned.

The Contractor shall deliver on a timely basis to other trades any equipment that must be installed during construction.

- B. The Electrical Contractor shall be responsible for field measurements and coordinating physical size of all equipment with the architectural requirements of the spaces into which they are to be installed.
- C. The Electrical Contractor shall be responsible for removal and disposal of all waste materials created by this installation process including but not limited to:
 - 1. Shipping and packaging materials.
 - 2. Items removed from existing system.
- D. The Electrical Contractor shall be responsible for all lifts, ladders, scaffolding and/or other devices required for the complete installation of this system.
- E. The Electrical Contractor shall be responsible for all painting and patching that may be required as a product of this installation process.
- F. The Electrical Contractor shall run all conduit so that it is concealed above hung ceiling, below floors or in walls whenever possible. Any exposed conduit shall be run in an aesthetically pleasing manner and painted to match existing conditions.
- G. The Electrical Contractor shall install all lighting control and dimming equipment in accordance with manufacturer's approved shop drawings. All minimum spacing requirements between 120/208V and various low voltage wire types must be maintained. All installation must be in accordance with National, State and Local codes.
- H. The Electrical Contractor shall be responsible for resolving all Union disputes and jurisdictional issues.
- I. All branch load circuits shall be live tested before connecting the loads to the dimmer system load terminals. Each circuit shall require separate neutrals.
- J. It shall be the responsibility of the Electrical Contractor to provide all bonding, job permits and related fees as applicable.
- K. The Electrical Contractor shall provide a copy of their License to operate as an Electrical Contractor in the state of New Jersey / New York. The Electrical Contractor shall also submit an Insurance Certificate for this project.
- L. The Electrical Contractor shall be responsible for coordinating the installation and configuration of this system with the Theatrical Systems Integrator.

4.02 THEATRICAL SYSTEMS INTEGRATOR'S SERVICES

- A. Upon completion of the installation, including testing of load circuits, the contractor shall notify the Theatrical Systems Integrator's (herein referred to as "TSI") Project Manager that the system is available for formal checkout by the dimming system manufacturer.
- B. Notification shall be provided in writing, 21 days prior to the time factory-trained personnel are needed on the job site.
- C. No power is to be applied to the dimming system unless specifically authorized by written instructions from the TSI's Project Manager.

- D. The purchaser shall be liable for any return visits by the factory engineer as a result of incomplete or incorrect wiring.
- E. Upon completion of the formal check-out, the factory engineer shall demonstrate operation and maintenance of the system to the Owner's Representatives. Training session shall not exceed four working hours.
- F. A second training session shall be provided six months after the first training session. Training session shall not exceed four working hours. Additional training shall be available for purchase. Scheduling for training sessions shall be made in writing, 21 days prior to the time factory-trained personnel are needed on the job site.

4.03 RECORD DRAWINGS AND MANUALS

- A. Record Drawings
 - 1. The TSI shall submit two sets of full sized Record Drawings to the Owner for final acceptance. These drawings shall be fully revised and reflect the actual finished installation. The drawing set shall be 100% complete and shall include all schematics, details and Bill of Materials for future maintenance and repair of all systems supplied by the TSI.
 - a. Each drawing shall be dated and stamped as a Record Drawing.
 - b. Each rigging drawing shall be stamped by NY State PE.
 - c. Prints shall be full sized, stapled into sets. They shall be fully legible.
 - d. Any future revisions or modifications during the warranty period shall require that the Owner's Record Drawings be updated also.
- B. The TSI shall provide a Repertory Lighting Plot for the purpose of hanging and focusing theatrical lighting fixtures prior to project completion.
- C. Manuals
 - 1. Manuals shall be bound by the TSI in loose-leaf binders and labeled with tabbed dividers for easy reference.
 - 2. The TSI shall provide two sets of Instructions and Maintenance manuals to the Owner. The manuals shall consist of, but not be limited to:
 - a. System Description
 - b. User Operating Instructions
 - c. User Maintenance Instructions
 - d. Catalogue Cut Sheets from all equipment purchased
 - e. Spare Parts Listing
 - f. 11" x 17" reduced drawings of all system assemble drawings needed to perform system maintenance.

4.04 WARRANTY

- A. Manufacturer shall warrant products under normal use and service to be free from defects in materials and workmanship for a period of two years from date of delivery.
- B. Warranty shall cover repair or replacement of such parts determined defective upon inspection.
- C. Warranty does not cover any product or part of a product subject to accident, negligence, alteration, abuse or misuse. Warranty does not cover any accessories or parts not supplied by the manufacturer.
- D. Warranty shall not cover any labor expended or materials used to repair any equipment without manufacturer's prior written authorization.

4.05 MANUFACTURER'S SERVICES

- A. Upon completion of the installation, including testing of load circuits, the contractor shall notify the dimming system manufacturer that the system is available for formal checkout.
- B. Notification shall be provided in writing, two weeks prior to the time that factory-trained personnel are needed on the job site.
- C. No power is to be applied to the dimming system unless specifically authorized by written instructions from the manufacturer.
- D. The purchaser shall be liable for any return visits by the factory engineer as a result of incomplete or incorrect wiring.
- E. Upon completion of the formal check-out, the factory engineer shall demonstrate operation and maintenance of the system to the owner's representatives. Training shall not exceed four working hours. Additional training shall be available upon request.

4.06 RIGGING INSTALLATION - GENERAL

- A. The intent of this specification is to define parameters for furnishing and installing a Motorized Rigging System to the owner. The system is designed to meet the specific operational requirements of the Project. Performance deviations will not be accepted. All Stage Rigging Equipment furnished for this Theatrical application shall be the product of one Manufacturer, and supplied to the Rigging Contractor for installation. Prior to purchasing any rigging equipment, the contractor shall submit drawings reviewed, stamped, and signed by a NY State Professional Engineer. Drawings shall include all material to be used, rated weights, mounted equipment, and attachment points.
- B. The scope of this work shall include the following:
 - 1. The Rigging System shall be furnished and Installed by the trained theatrical rigging installers. The entire installation of the Rigging System shall include:
 - a. Unloading and transporting the hoists into the venue.
 - b. The Rigging Contractor shall confirm the Location, Orientation and dimensions of the Building Steel in order to assure that the mounting of the Hoist Modules to the Building Steel can be accomplished in the manner in which it was specified
 - c. Wiring the 3 phase 208v feed and Control to the Hoist Motors
 - d. Provide the wiring, load terminations for the load circuits and wire the flat cable (provided by the manufacturer) to the terminals in the terminal compartment of the Connector Strip
 - e. Provide the 3 phase 208v feed to each Hoist through the emergency stop motor rated contactor sized appropriately for all 1.5HP 309lb Self climbing Hoist which shall shut off all power to all of the Hoist Motors.
 - f. Provide and Install a Wall Mounted Nema 1 Enclosure, U.L Tested and Listed, to house the Hoist Emergency Contactors and Branch Protection System properly sized for each of the 1.1 kw/1.5HP Self climbing Hoist motors.
 - g. The Electrical Contractor shall make all electrical connections between the various system components and supply all necessary labor and electrical components including, (wire, pipe, hardware, and etc.)
 - h. It shall be the responsibility of the Electrical Contractor to provide a complete working system to the owner at completion
 - 2. The Rigging Contractor shall provide all of the motorized hoist hardware to the project. All hoists and associated hardware including wiring raceways and pipe shall be furnished by the Hoist Manufacturer and be U.L. Listed and approved as a complete system including the Control System and Electrical Enclosure. The Rigging Equipment shall be installed by

Rigging or Electrical Contractor and shall meet all local code requirements under supervision of TSI. All components necessary to make the system a working network shall be included in the bid. Actual length of network cabling and system layout shall be verified during the project approval process.

3. Line voltage wiring shall be terminated per drawings and specifications by the Electrical Contractor and shall be tested for shorts and other damage prior to system energization.
4. Line voltage wiring is to have one hot wire and one neutral wire per circuit for every circuit in the house and stage lighting Systems. DO NOT COMMON NEUTRALS. Provide additional grounds as required.
5. The Electrical Contractor shall wire the hoists via a terminal boxes provided by the Electrical Contractor. From the terminal box, the Contractor shall wire the load circuits to the load terminal compartment of the Hoist located on the diverter pulley side of the Mini Hoist and the terminal boxes mounted between the diverter pulleys on the Batten Hoist. The Electrical Contractor shall also provide a three phase / 208 volt power feed to accommodate the 1.1 KW/2.2 AMP Self climbing Hoist motors. The 3-phase power feed along with 24 volt DC control wiring shall terminate in the terminal compartment of the motor module of the Hoist. In all of the Hoists carrying load circuits, the load circuits to the connector strip shall be via the U.L. flat folding cable. The length of the cable that is required for each cable management system shall be determined by the travel distance. The Batten Hoist's flat folding cable shall be pre-wired from the factory but terminated by the Electrical Contractor at the terminal box and in the connector strips.
6. The Electrical Contractor shall furnish and install an electrical enclosure to house the (5) 3 pole motor rated circuit breakers, for the circuit protection of each 1.1 KW three phase 1.5HP three phase motor for the Stage Hoist.
7. Provide Motor Rated Contactors for the Emergency Stop Button mounted in the Control System. All auxiliary electrical equipment and electrical disconnects / breakers shall be supplied by the Electrical Contractor and shall not be the responsibility of the Hoist manufacturer or their agent. The Electrical Contractor is to provide and install control panel locations, control receptacles boxes, etc., as indicated.
8. The Electrical Contractor shall install any new wiring devices as specified or as indicated on the Approved System Rigging Submittal Drawings.
9. The 1" ½ schedule 40 black iron pipe is to be supplied by the Manufacturer. Joints are to be seamed with internal pipe sleeves.
10. The owner shall have the option of videotaping any training sessions of the hoist system provided by the Manufacturer if they so choose. Videotaping shall not be the responsibility of the Contractor.

4.07 DRAWINGS

- A. Drawings shall be furnished as follows:
 1. Six sets of B-size drawings shall be furnished for approval within 30 days of award of contract. Prior to fabrication of equipment, one set shall be returned appropriately marked as the approval document.
 2. The Rigging Contractor shall be furnished with up to four sets of B size drawings for his/her use.
 3. The owner shall be supplied with two sets of "as-built" drawings at the completion of the installation. These drawings shall be part of an operations and maintenance manual covering all major items installed.
 4. All manufacturers other than the three approved manufactures listed below must submit to the Architect, 10 Days prior to the Bid Date, drawings and or samples of the Equipment which would be considered either equal or superior to the equipment being specified.
 5. All rigging drawings shall be reviewed and stamped by a NY State Professional Engineer.

4.08 APPROVED RIGGING MANUFACTURERS

- A. Desisti Lighting
- B. Secoa
- C. Peter Albercht Company Inc.

4.09 QUALITY ASSURANCE

- A. To ensure a uniform installation and single responsibility, the motor rigging system shall be the product of one manufacturer. This manufacturer shall have manufactured motorized rigging equipment and controls for a minimum of 10 years and provide a list of 25 similar projects installed and operational in the United States. Manufacturers, who only assemble components supplied by others (even if that component is private labeled) are excluded from this bid. Mixing of equipment brands shall not be acceptable.
- B. The manufacturer shall employ a factory trained service technician available to provide technical assistance via a 24hour hot line. The factory technician shall be available and capable of both supervising the installation and energizing the system.

4.10 STANDARDS

- A. All Stage Hoists shall comply with all the safety standards of the three internationally recognized testing authorities who publish safety standards specifically written for hoist safety. Those authorities shall include TUF, the German Safety Standard, the DIN #15560 standard, part 46, safety standards (Worldwide safety standard form suspension systems mounted above an assemblage of people).
- B. Any product submitted for approval must be TUF certified and U.L. Approved and carry the U.L. label tested and approved as a complete system. Adding UL approved components to a Hoist System that was not tested as part of the complete system will not be approved.

4.11 SUBSTITUTIONS

- A. The motorized rigging equipment specified is the result of efforts on the part of the owner to select equipment for reliability, ease of maintenance and suitability for the owners' purposes. The system shall be based on equipment as manufactured by DeSisti Lighting, 1011 Route 22 East Unit D - Mountainside, NJ or approved equal.
- B. All other proposals for equipment from other manufacturers will be considered as alternate only. There will be no other equipment approved prior to bid. The price for alternate equipment must be identified as an alternate bid and the amount stated as an addition or deduction to the base bid.
- C. Submittals shall include but not be limited to complete bill of materials; one line control riser that identifies, by product name, all rigging and rigging control equipment as well as wire types and counts; cut sheets on all proposed equipment showing full technical specifications, and a document identifying all deviations from this specification.
- D. Any revision or addition to the wiring required by substitute equipment shall be the responsibility of the substituting The Rigging Contractor. This Rigging Contractor shall also be responsible for any additional architectural or engineering fees occasioned by the necessity of evaluating alternate proposals.

4.12 FABRICATION

- A. Fabrication shall begin only after approved drawings and a written notice to proceed have been delivered to the manufacturer at the manufacturer's place of business.

4.13 ENERGIZATION

- A. A qualified engineer employed full time by the manufacturer shall visit the job site after installation is complete and prior to the energization of the system to inspect, test and adjust the system. She/he shall also at that time instruct the owners' representatives in the operation and maintenance of the system. These services shall be included in the base bid and include two days of site time.

4.14 WARRANTY

- A. DeSisti Lighting (or approved equal) warrants to the original owner or a retail customer that for a period of one year from date of delivery, or energization of the permanently installed system, its products will be free from defects in materials and workmanship under normal use and service.

4.15 MANUFACTURER'S SERVICE

- A. Services shall be provided directly by the manufacturer and return calls shall be made within 24 hours by a factory technician.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Interior and exterior 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 (2014).
- F. NFPA 101 - Life Safety Code.
- G. LM-79-08, IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products
- H. LM-80-08, IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources
- I. NYECC and ASHRAE 90.1.
- J. UL924: Emergency Lighting and Power Equipment; Current Edition. Including All Revisions.

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 2.03A of specification 265000. 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. Two (2) of each none production lighting light fixtures as shown on light fixture schedule.

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 drivers. Where dimming is shown on drawings, provide dimmable type drivers.
- C. All fixtures equipped with emergency battery packs shall have test light and switch accessible and visible from the room floor.
- D. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes and listed and labeled as complying with UL 924.

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. Minimum 0.125" thick and to be virgin acrylic.
 2. Low voltage - Tempered glass, to enclose lamp.
- F. LAMPS: SYLVANIA, PHILLIPS or GENERAL ELECTRIC, as selected by the Electrical Contractor. Note, all lamps for one project to be furnished by the same manufacturer unless otherwise specified. At the end of the project, the Electrical Contractor shall turn over to the Owner one lamp envelope from each type installed. The Contractor shall be responsible for replacing all lamps which burn out during construction and up to ninety (90) days after Owner occupancy of the building.
- G. VOLTAGE: As noted on the LIGHTING FIXTURE SCHEDULE. Contractor is responsible for field verifying available voltage(s) and ordering fixtures, ballasts, and transformers accordingly.
- H. 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.
- I. 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 SED REQUIRED LIGHT LEVELS

- A. Requirements for maintained horizontal foot-candles for each location within each building are listed below. Confirm designated use of each "Location" with owner and engineer prior to beginning calibration work: **Light levels shall not drop below SED standard guidelines as shown in chart.**

Location	Required Maintained Horizontal Foot-Candles
Classrooms, study halls, and lecture rooms [on desks and tables]	50
Offices [on desks]	50
Libraries [on desks and tables]	30
Libraries [book stacks]	50
Music rooms [on work]	40
Sewing rooms, drafting rooms, home economics [on work]	50
Shops, laboratories, and art rooms [on work]	50
Computer Rooms [on work]	50
Gymnasiums and playrooms	30
Cafeterias	40
Auditoriums	10
Conference Rooms	30
Reception Areas	20
Locker rooms and toilets	10

- B. Contractor shall program all fixtures as per district requirements.

- C. Contractor shall calibrate fixtures as per district requirements.

2.04 EMERGENCY LIGHTING UNITS

- A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- C. Battery:
 - 1. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.05 WARRANTY

- A. All light fixtures shall have a 5-year manufacturer's warranty. Warranty shall begin on date of substantial completion.

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. Relamp luminaries that have failed at completion of project.
- S. Battery backup unit equipment emergency lighting shall be circuitred in accordance with NEC Article 700.12. Equipment on the same branch circuit as that serving the normal lighting in the area to be connected ahead of any local switches.

END OF SECTION

PART 1 - GENERAL**1.01 GENERAL REQUIREMENTS**

- A. The work specified in this Section shall be in accordance with the requirements of the Contract Documents.

1.02 AUDIO VISUAL SUMMARY AND SCOPE OF WORK

- A. The contractor shall provide the services of an Audio Visual System Integrator. Audio Visual System shall be integrated by Advance Sound Company (Thomas DePace, 631-667-0973 Farmingdale, NY) or approved equal. Audio Visual System shall be provided by a single source supplier which includes A/V equipment shown on Drawing BA-E6.3 and associated floor plans.
- B. The Contractor shall provide complete, turnkey multimedia systems performing all of the services and functions as described herein, together with all other apparatus, cable, materials, labor, tools, transportation, and any other resources necessary to provide complete systems.
- C. Sound system include systems located in the Farragut Middle School/High School Auditorium. It is the intent of this specification system to provide a full turn-key audio system with cabling, conduit, mounting, and testing as required
- D. Types of work in this section include (but are not necessarily limited to):
 - 1. Sound reinforcement equipment.
 - 2. Racks and consoles.
 - 3. Portable and accessory equipment.
 - 4. Verification of dimensions and conditions at the job site.
 - 5. Submission of shop drawings for review prior to fabrication.
 - 6. Fabrication and assembly shall be in accordance with these specifications: Equipment manufacturer recommendations, all applicable code requirements.
 - 7. Inspection, alignment, final adjustment of completed installation, demonstration for acceptance and instruction of operating personnel.
 - 8. Coordination with other trades of adjoining work.

1.03 DEFINITION OF TERMS

- A. The term Contractor or Audiovisual Contractor as used herein refers to the party responsible for supplying all services and equipment covered herein and on related electrical drawings.
- B. The terms Owner, Consultant is used herein to refer to organizations, individuals and their representatives as typically defined.

1.04 INDUSTRY STANDARDS

- A. Regulatory Agencies: Work shall be carried out in conformance with applicable Building and Electrical Codes, the requirements of OSHA and the applicable provisions of Underwriter's Laboratories, ANSI, Electronic Industries Association and National Fire Protection Association.

1.05 QUALITY ASSURANCE

- A. The system shall be comprised of components that are of professional quality. Approved manufacturers shall be as specified herein.
- B. This Contractor shall be an authorized direct representative of the manufacturer of the specified loudspeakers, preamplifiers and amplifiers selected by the Consultant.

- C. The Contractor shall have all required manufacturer's certificates where required (i.e. Digital Media Certified Engineering DMC-E and Design DMC-D)
- D. The Contractor shall have on staff, individuals that have received ANSI Certification through the ISO/IEC 17024 General Requirements as a "Certified Technical Specialist"
- E. The Contractor shall have on staff, individuals that have been trained on OSHA Safety regulations receiving OSHA-30 Certification
- F. This Contractor shall have successfully provided installation and engineering services over completed installations for a period of five years or more and shall have completed at least five major sound system installations of this type. The Owner and Consultant shall be the final judge of suitability of experience.

1.06 SUBMITTALS

- A. Shop Drawings and Samples:
- B. The following scaled drawings shall be provided for review prior to fabrication:
 - 1. Equipment rack layouts showing equipment layout, rack accessories and modifications (min. 1.5"=1'-0" scale).
 - 2. Installation details (min. 1"= 1'-0" scale).
 - 3. Block schematics of all system equipment, internal wiring and system element interconnection (as necessary). Include pictorial of all patching panels and include proposed patch point legend.
 - 4. Major dimensions components and finishes of all equipment and accessories.
 - 5. Catalog or data sheets shall be used where applicable.
 - 6. Suspension arrangement for the loudspeakers. This drawing shall indicate hanging details and orientation of loudspeakers as required for proper coverage as specified. Shop drawings shall be sealed by a structural engineer licensed in the State of New York.
 - 7. All shop drawings shall be executed on CAD and in conformity with the best modern practice.
 - 8. A 3" x 5" space shall be reserved in the lower right corner of each drawing for the Consultant's review stamp.
 - 9. Drawings used in the fabrication and installation of the systems specified herein shall bear the Consultant's stamp.
 - 10. Review of shop drawings shall not be considered as a guarantee of measurements of building conditions. Where drawings are indicated as having been reviewed, said review does not mean that drawings have been checked in detail, and said review does not in any way relieve this Contractor from his responsibility or necessity of furnishing material or performing work as required by the Contract Specifications.
- C. Manuals:
 - 1. Within thirty days of the Acceptance Tests, this Contractor shall furnish the following:
 - a. Four copies of block diagram of the system giving the essentials of the installation and their functional relations. Another copy of the diagram(s) shall be wall-mounted behind glass at the equipment rack location.
 - b. Four copies of a complete instruction, operation and maintenance book, including all block and schematic diagrams, wiring diagrams, sizes, and manufacturer technical descriptions of components.

1.07 DELIVERY, STORAGE AND HANDLING

- A. The equipment to be furnished hereunder shall be delivered to the building upon receipt of written notice from the Owner to do. Delivering hereunder shall include unloading the vehicle, transportation to final destination within the building.
- B. Fabricated and assembled equipment shall be wrapped and sealed in polyethylene and substantially boxed for shipment. Standard components shall be shipped in manufacturer's original packing. Boxes shall clearly indicate equipment contained, "front", "top", "fragile", nature of components and site location.
- C. Liaison shall be made between this Contractor and the Owner for the delivery schedules of components being shipped. The requirements for safe handling and storage of these components shall be coordinated between these two parties.
- D. The Contractor shall be solely responsible for the security of equipment at the project site until final acceptance by the Owner and Consultant.

1.08 ALTERNATES

- A. Alternate Equipment:
 - 1. Alternate equipment is that which has been determined to have substantially similar characteristics to that specified and has been judged suitable for use in the system.
 - 2. Where alternate equipment is used changes or modifications to contingent work and equipment may be required to maintain the integrity of the system. This Contractor shall be responsible for maintaining the overall performance of the system when alternates are employed.
- B. Substitutions:
 - 1. Substitute equipment is that which may or may not have been reviewed for inclusion in the system design, or which may have become available following issuance of the Contract Documents.
 - 2. Whenever any product is specified by brand name, manufacturer's or supplier's name or trade name and catalog or model number or name, the intent is not to limit competition but to establish the standard of quality and functional performance of the system and its components.
 - 3. Substitution requests shall be made during submittals. This Contractor shall have the burden of proving at his own cost and expense to the satisfaction of the Consultant that the proposed product is equal to the named product. The Consultant has the right to establish criteria for a product approval. Criteria may include laboratory test data as provided by an independent accredited laboratory approved by the Consultant. If no such testing has been carried out, this Contractor shall instigate such testing at his own cost. In addition, the Consultant will inspect and test any proposed substitution prior to acceptance. This Contractor shall ship, prepaid by UPS (or other carrier as agreeable by the Consultant) the substitution with all shipping costs paid by the Contractor. If the Consultant deems that the item is too large to ship or if, for other reasons, it is deemed that a field inspection is preferred, this Contractor shall pay for the time and reimbursable costs of the Consultant and Owner to conduct the field inspection at the Consultant's and Owner's convenience.
 - 4. If this Contractor fails to comply with the provisions of this Article, or if the Consultant determines that the proposed product is not equal to that named, the Contractor shall supply the product named.
 - 5. This Contractor shall have and make no claim for the extension of time or for damages because the Consultant requires a reasonable period of time to consider a product proposed by this Contractor or because the Consultant disapproves such a product.

6. Where optional materials or methods are specified and/or approved, this Contractor shall make all adjustments to contingent work necessary to accommodate the option he selects.
 7. The unit costs of the substitution shall be included with the submittal.
- C. New Products:
1. Minimum performance requirements for individual components specified herein shall be as detailed in the latest published Manufacturers data sheets.
 2. In the event that one or more of the products specified herein is unavailable, this Contractor shall make recommendations to the Consultant as to what substitutions are available to meet the intent of the Specification. The Consultant shall then determine what product; either from the Contractors' recommendations, or from the Consultant's own research, may be substituted.
 3. The Consultant reserves the right to substitute a new product that may have become available following the issuance of the Contract Documents. Such substitutions shall be made prior to final review of the equipment list.
 4. A change order resulting from such substitutions shall not result in an increase or decrease to the Project cost in excess of the difference between the list price of the specified product and the substitute price.

1.09 GUARANTEE AND SERVICE

- A. Contractor shall warrant systems and equipment to be free of defective components, faulty workmanship or improper adjustment for a period of one year from the date of Owner's acceptance. Paint and exterior finishes and fuses are excluded.
- B. Warranties on manufactured equipment shall be designated to the Owner on the date of system acceptance.
- C. This Contractor shall provide at his expense maintenance service for a period of one year after final acceptance of the installation. The service shall consist of at least two (2) visits to the site for checking and adjusting of equipment.
- D. This Contractor shall be required to answer all service calls within twenty-four hours of a request being made.
- E. The Contractor shall provide a price per year for years two through five for a standard preventative maintenance agreement

PART 2 - PERFORMANCE REQUIREMENTS

2.01 SOUND SYSTEM

- A. Certain overall performance requirements of the sound amplification system shall be checked by measurement. Each system as designed meets the following requirements based upon available data and the manufacturer's published specifications. The Contractor shall be responsible for use of the equipment specified in the manner specified, and each component's conformance with its manufacturer's specifications.
- B. Overall system frequency response shall be ± 3 dB, 250-8,000 Hz when measured in 1/3 octave bands at any seat. Frequency response shall be measured using Time Delay Spectrometry or 1/3 Octave Real Time Analyzer.
- C. Overall system noise shall be at least 60 dB below +40 dBm (10 watts) output in a frequency range of 20 to 20K Hz measured from the microphone matched input to the speaker terminals.

- D. Residual noise and hum shall be below the masking noise levels produced by the air conditioning system, for an overall signal-to-noise ratio of 68 dB for the entire system.
- E. System Electronics Characteristics:
 - 1. Frequency Response: 20-20,000Hz +1-0.5 dB
 - 2. Signal to Noise: Better than -75 dB
 - 3. Distortion: 0.1% THD maximum
 - 4. OPL (Operating Level): +4 dBm

2.02 SYSTEM EQUIPMENT

- A. Microphone System and Accessories:
 - 1. Outputs of all microphones shall be 150-250 ohms, balanced with respect to ground. Microphone mounts and holders shall be supplied by the microphone manufacturer. The term "sensitivity" as used herein for microphones and expressed in dBm (dB referenced to .001 W) is the microphones available electrical input power level, when driven by a sound pressure of 10 dynes/cm².
- B. Microphone System Installation and Accessories:
 - 1. Cable indicated on the drawings for interconnection between system receptacles equipment shall be provided by the Contractor using existing or new conduit as needed. Contractor shall verify conduit is reusable for new system requirements.
 - 2. Microphone extension cables shall be supplied as specified herein. Each flexible extension cable shall be fitted at one end with a Neutrik NC3MX-B connector, the other end shall be fitted with a Neutrik NC3FX-B connector, Flexible cables shall be Canare L-4E6S.
- C. Rack-Mounted Control and Amplification Equipment:
 - 1. Permanent rack shall be constructed of 12 gauge steel top and bottom and 16 gauge sides. Panel mounting channels shall be provided with holes on E.I.A. spacing. Dimensions shall be 22" wide by 25" deep by the height necessary to accommodate the specified equipment or as shown on the drawings.
 - 2. Unused panel space shall be filled with blank solid panels or ventilating panels. Provide all accessories indicated on the drawings.
 - 3. All racks shall have black baked enamel finish.
 - 4. Rack mounted equipment shall be provided with security covers where indicated in the equipment list to avoid tampering with preset levels. If manufacturer does not provide suitable security covers for a specified device, Contractor shall provide alternate such as Middle Atlantic SF series.
 - 5. All rack mounted equipment shall be utilize security screws such as Middle Atlantic H-T.
 - 6. All internal rack wiring of microphone and line level cable shall be Belden #8451.
- D. Loudspeakers and Associated Equipment:
 - 1. All loudspeakers shall be phased together - 12 AWG cable to each speaker.
- E. Loudspeaker:
 - 1. Layout and mounting arrangements of loudspeakers shall be as required to provide specified coverage of the seating area.
 - 2. Loudspeakers shall be easily removable and replaceable in the same position shall have safety cable attachment to framework.
 - 3. There shall be resilient mounting between the loudspeaker and support structure in the form of #W30N neoprene hangers, as manufactured by Mason Industries, or equal. Isolators shall provide a minimum of 90% Isolation at 20Hz.
 - 4. Design of the suspension arrangement, exact mounting details and aiming shall be indicated on the shop drawing submitted to the Consultant for review prior to installation.

Coordinate scaffolding or moveable lift requirements for access to the speaker location with the General Contractor.

F. Receptacle Plates

1. Receptacle plates shall be provided as indicated on the drawings. Coordinate exact sizes and orientation with Electrical Contractor who shall provide back- boxes.
2. Receptacle plates shall be provided with terminal strips wired to receptacles to facilitate termination to cable in conduit. Field soldering shall not be permitted unless specifically approved by the Consultant.
3. Finish for all wall mounted receptacle plates shall be 1/8" thick anodized black aluminum with engraved white lettering.

2.03 MAJOR EQUIPMENT ITEMS

2.04

ITEM	MANUFACTURER AND MODEL	QUANTITY
TENSIONED COSMOPOLITAN ELECTROL 108"X192" HD1.1	DA-LITE-21872L	ONE (1)
FULL BODY (SCREEN) CRATING	DA-LITE-33664	ONE (1)
ADDITIONAL FRIGHT FOR ABOVE		ONE (1)
E-VISION LASER 6500	DPI-120-061	ONE (1)
3.0 - 5.0 : 1	DPI-116-208	ONE (1)
E-VISION LASTER 6500, 7500, 8500, 10K, 4K ADJUSTABLE CEILING MOUNT	DPI-118-192	ONE (1)
3-SERIES<< 4K DIGITALMEDIA PRESENTATION SYSTEM 150	CRESTRON-DMPS3-4K-150-C	ONE (1)
AIRMEDIA<< PRESENTATION SYSTEM 200	CRESTRON-AM-200	ONE (1)
WALL PLATE DIGITALMEDIA 8G+ TRANSMITTER 200	CRESTRON-DM-TX-200-C-2G-B-T	TWO (2)
7" WALL MOUNT TOUCH SCREEN	CRESTRONG-TSW-770-B-S	ONE (1)
12 IN, 12 OUT DSP, 64X64 DANTE	SYMETRIX-PRISM 12X12	ONE (1)
1250 FOUR CHANNEL DRIVE CORE POWER AMPLIFIER	CROWN-DCI4	ONE (1)
CUSTOM MIC, UTILITY, LINE OUT PLATES	PROCO	FOUR (4)
ENTASYS 3-WAY COLUMN BLACK	COMMUNITY-ENT-FR	TWO (2)
ENTASYS LOW RANGE COLUMN	COMMUNITY-ENT-LF	TWO (2)
POWERED SPEAKER, 1100 WATT, FORMERLY DXR10-CA	YAMAHA-DXR10MKII	TWO (2)
MIC CABLE XLRf/XLRm 25FT	PROCO-EXM25	ONE (1)
32 CHANNELS AND 1 MASTER/48 INPUT MIXING CHANNELS	YAMAHA-TF-5	ONE (1)
LIGHTWEIGHT DUST COVER TF5	YAMAHA-TF5-COVER	ONE (1)
DANTE EXPANSION CARD FOR TF MIXER	YAMAHA-NY64-D	ONE (1)
DIGITAL STAGE BOX WITH DANTE	YAMAHA-TIO1608-D	TWO (2)
DUAL WIRELESS SYSTEM WITH 2 SLXD2/SM58 HANDHELD TRANSMITTERS	SHURE-SLXD24D/SM58-G58	TWO (2)
DIGITAL WIRELESS BODYPACK TRANSMITTER FREQUENCY G58	SHURE-SLXD1-G58	FOUR (4)
OMNIDIRECTIONAL CONDENSER MINIATURE-LAVALIER	SHURE-WL93T	FOUR (4)

STATIONARY FM TRANSMITTER (72 MHZ)	LISTEN-LT-800-072	ONE (1)
INTELLIGENT DSP RF RECIEVER (72 HMZ)	LISTEN-LR-4200-072	TWELVE (12)
EAR SPEAKER	LISTEN-LA-164	TWELEVE (12)
NECK LOOP	LISTEN-LA-166	FOUR (4)
UNIVERSAL ANTENNA KIT (72 AND 216 MHZ)	LISTEN-LA-122	ONE (1)
UNIVERSAL RACK MOUNTING KIT	LISTEN-LA-326	ONE (1)
RECHARGEABLE AA NIMH BATTERIES (2)	LISTEN-LA-362	TWELEVE (12)
16-UNIT PORTABLE RF PRODUCT CHARGING/CARRYING CASE	LISTEN-LA-311-01	ONE (1)

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine all work prepared by others to receive work of this Section and report any defects affecting installation to the Owner for correction. Commencement of work will be construed as complete acceptance of existing conditions.

3.02 INSTALLATION GENERAL

- A. The Contractor shall supply all racks, furniture, consoles, etc., required for the installation, and needed to provide completed systems. Only to the extent that such ancillary equipment is specified elsewhere is it excluded from these system specifications.
- B. All conduits and high-voltage power to be run by District retained electrical contractor
- C. All equipment except portable equipment shall be held firmly in place. This shall include loudspeakers, cables, control equipment, rack equipment, etc. Mountings shall be rigid except where resilient isolation is required, such as with loudspeaker clusters. Fastenings and supports shall be adequate to support their loads with a safety factor of at least five (5).
- D. All switches, jacks, outlets, cables, etc., shall be clearly, logically and permanently marked during installation. All cables shall be marked with standard alphanumeric markers at each end. These markers codes shall be identical to those noted on the shop drawings.
- E. The Contractor shall take such precautions as are necessary to prevent and guard against electromagnetic/electrostatic/radio frequency interference.
- F. Care shall be exercised in wiring, so as to avoid damage to the cables and to the equipment. Between racks, cabinets, consoles or modules all cables shall be well supported and shall be neatly laced and dressed. All joints and connections shall be made with rosin-core solder or with mechanical connectors approved by the Consultant. Between racks, cabinets, consoles or modules, all cable shall terminate in terminal connectors, strips, blocks or boards.
- G. All audio wiring shall be executed in strict adherence to standard broadcast practices as detailed in "Sound System Engineering" 2nd Edition, by Don and Carol Davis.
- H. All power level circuits shall be run on the right side of the rack or cabinet as viewed from the rear. All other circuits shall be run on the left side as viewed from the rear.

- I. Microphone and 600-ohm line conduits shall be mechanically and electrically connected to receptacles boxes, and electrically grounded to the ground bus in the power panel.
- J. Microphone line shields shall be grounded only at the end that terminates at the equipment rack(s) and shall be grounded only to the common ground of the equipment rack. All audio grounds in the equipment rack(s) shall be connected to a common point on the rack. All racks then shall be grounded to a single point at the power panel buss bar by means of a minimum AWG #4 insulated conductor. The grounding conductor conduit shall be totally electrically isolated from the equipment racks and from the ground panel by means of plastic bushings or other similar approved means.
- K. The total resistance of the ground system from the equipment racks to the power panel ground shall not exceed .1 ohm.
- L. Other shields shall be grounded only at the power amplifier inputs or the console outputs, and shall be terminated at the "floating" end with "wedge on" collars, or with plastic tape. Continuity of shield shall be preserved at connecting points. Under no circumstances shall the AC neutral be used as a reference ground. As stated above, audio shields shall be connected to ground at a common point.
- M. Final location of all equipment shall be located as shown on the drawings, or as located in the field or as shown on supplementary drawings prepared by the Consultant.
- N. Drawings are diagrammatic and indicate general arrangement of systems and work included. Follow drawings in laying out work and check drawings of other trades relating to work to verify spaces in which work will be installed. Maintain headroom and space conditions to all points.
- O. Provide a framed functional diagram for system equipment that reflects the final as-built systems at each rack location.
- P. Equipment racks shall be pre-wire in Contractor's shop and thoroughly tested for proper signal flow and equipment function prior to delivery of racks to the job site.
- Q. Between racks, cabinets, remote receptacles, all speaker level cable shall terminate in terminal strips.
- R. A punch block shall be dedicated for use with each audio patch panel. Any audio circuit terminating in a patch panel shall interface through a punch block. Patch panels shall be wired so all signal sources (outputs from equipment), shall be connected to the bottom row. Any efficient combination of top and bottom rows shall be used for multiples.
- S. Drawings are diagrammatic and indicate general arrangement of systems and work included. Follow drawings in laying out work and check drawings of other trades relating to work to verify spaces in which work will be installed. Maintain headroom and space conditions to all points.
- T. Final location of all equipment shall be located as shown on reviewed shop drawings, or as located in the field by the Consultant

3.03 WORKMANSHIP

- A. The installation of all work shall be neat. All work, equipment, etc., shall be plumb and square.
- B. The Contractor shall keep the job adequately staffed at all times. Unless illness, loss of personnel, or other circumstances beyond the control of the Contractor intervene, he shall keep the same individual in charge throughout its execution and shall exercise engineering

supervision over the entire installation and shall inspect the installation at least twice prior to acceptance testing.

- C. Following installation, all soiled, abraded or discolored surfaces of work installed herein will be cleaned and left free from blemishes or defects
- D. Work that is damaged or improperly installed will be removed and replaced and the entire installation left in complete satisfactory condition.
- E. Any damage to the facility, of any kind, brought about by Contractor's work shall be repaired at no cost to the Owner.
- F. It shall be the responsibility of the Contractor to cooperate with other trades. In order to achieve well-coordinated progress and satisfactory final results. He shall watch for conflicts with work of other contractors on the job and execute, without claim for extra payment, moves or changes as are necessary to accommodate other equipment or preserve symmetry and pleasing appearance.

3.04 CLEANING

- A. The Contractor shall remove from the job site all rubbish and refuse at the end of each day and shall keep his work area clean.
- B. Following Installation, all soiled, abraded or discolored surfaces of work installed herein shall be cleaned and left free from blemishes or defects.
- C. Work that is damaged or improperly installed shall be removed and replaced and the entire installation left in complete satisfactory condition.
- D. Clean the areas affected by the Work to a level of operational cleanliness.
- E. Uncover all areas protected during fabrication. Dispose of covering material and debris accordingly.

3.05 ACCEPTANCE TESTING GENERAL

- A. Upon completion and wiring checkout and initial tests of the systems by Contractor, notify Owner and Consultant in writing that systems are ready for inspection.
- B. Contractor shall demonstrate the operation of each component of the system to the Consultant and Owner's representative.
- C. In case the need for further adjustments becomes evident during the demonstration and testing, Contractor's work shall be continued until the systems operate properly.

3.06 SYSTEM TESTS AND ADJUSTMENTS

- A. Initial tests and adjustments shall be performed by this Contractor who shall include the cost of these tests in his bid proposal. He shall furnish all equipment necessary and perform all work required to determine or modify the performance of the system in accordance with the specifications. Prior to equalization of the sound system, he shall carry out the following inspections of the sound system and submit to the Consultant the written results at each inspection for inclusion on the permanent records of the sound system.
 - 1. Verify signal flow through the entire system.
 - 2. Measure and record polarity, distortion, and parasitic oscillation, by use of an oscilloscope and oscillator. Begin by applying signal to the systems input; (usually a mixer), and

observe the devices output. Once the first device has been tested and is operating correctly, connect oscilloscope and oscillator to the next device down the line, and proceed with each device until all have been checked.

3. Measure and record the frequency response of each mixer/preamp in the system.
4. Measure and record the impedance of each loudspeaker line before connecting it to the output of its respective amplifier, and confirm that it is equal to or above the rated impedance.
5. Measure and record, with an oscilloscope, the output of each power amplifier. The input source to each amplifier being measured shall be a sine-wave oscillator with less than 0.5% frequency accuracy and adjusted to 10 dB less than full power output of the amplifier. Ascertain that full voltage for rated power can be reached without noticeable deformation of the wave form. Inspect the output sine-wave appearing on the oscilloscope for complete freedom from spurious oscillation, hum, noise, radio frequency interference, or other unexpected additional outputs.
6. Measure and record Z_{in} , Z_{load} , E_{in} , and E_{out} for each of the power amplifiers.
7. Measure and record input Z_{in} and output Z_{out} circuit voltage impedances, open circuit voltage E_o , and input E_{in} of all speech or music equipment, line amplifiers, and signal processors.
8. Measure and record the phasing of all loudspeakers.
9. Measure and record the polarity of all microphones to be used in the system.
10. Check all microphone lines and other interconnecting cable for correct wiring and shorts to ground.
11. The remote control shall be checked out for specified operation function requirements. "Remote" shall include operation of the portable system in conjunction with the fixed systems
12. Balance the levels of the loudspeaker units driven by different amplifiers in the same system to assure adequate coverage and level of sound from all loudspeakers.
13. Establish the normal settings for all level controls. All level controls on rack-mounted equipment shall be adjusted for optimum signal to noise ratio and signal balance and shall then be capped to prevent tampering. Response shall not vary more than ± 3 dB at any location on the field house floor or at the seating area
14. Prior to equalization of the system use a sweeping sine wave at the systems input to check loudspeaker cluster for extraneous noise. Even coverage of system should be confirmed by use of pink noise and handheld 1/3 octave real time analyzer. Observe variations in both level and spectrum shape while walking the seating area. If coverage problems are evident, improve coverage by re-aiming the loudspeakers. Provide all required scaffolding to access the clusters during the testing adjustment.

B. Equalization:

1. Provide the following minimal standard laboratory test equipment. Sound level meter and calibrator, 1/3 and 1/10 octave band analyzer, sine and square wave generator, impedance (CRL) bridge, distortion analyzer, calibrated microphone, audio oscilloscope or real-time spectrum analyzer, TEF System 20 (TDS) or SIMM, pink noise generator. This instrumentation shall be the product of Crown, Meyer, General Radio, Bruel & Kjaer, Tektronix, Hewlett-Packard or other approved national manufacturers.
2. Using a calibrated measuring microphone located in the seating area at twice the critical distance (at which direct sound from the source and reverberant sound are in a ratio of 1:1), establish the un-equalized acoustic amplitude response to a pink noise source. Bring the observed acoustic amplitude to within ± 3 dB uniformity (flat) from 63 to 8,000 Hz. Initially, the roll off at the low frequency end shall be set at 24dB/octave below 31.5 Hz. Initially, the roll off at the high frequency end shall be 3 dB/octave above 16kHz. Adjustments to these settings may be required following initial listening tests.
3. Adjust the sound system gain until it reaches regeneration (feedback). The frequency of regeneration shall be determined by oscilloscope or real-time spectrum analyzer. Adjust the appropriate filter until the observed regeneration ceases.

- C. The following test documentation shall be provided:
 - 1. List of personnel and certified test equipment used.
 - 2. Impedance of all loudspeaker lines.
 - 3. The input and output impedance of all active devices used to terminate passive devices and the value of any termination resistor used.
 - 4. The variation of acoustic distribution throughout the field house floor area above and below a reference level at each 1/3 octave center frequency from 63- 8,000 Hz.
 - 5. The recorded polarity and phase measurements of the loudspeakers.
 - 6. The recorded inspection results observed for hum, noise, parasitic oscillation, and RF interference from the output of each power amplifier.
 - 7. Normal settings of all system electronics.
- D. Equipment Tests:
 - 1. All equipment will be tested for proper operation. If any equipment does not appear to be functioning properly, further tests may be performed to determine whether it meets the pertinent specifications. Any measurements deemed necessary by the Consultant may be made to determine proper function.

3.07 COMPLETION AND NOTIFICATION

- A. Upon completion of installation of equipment, wiring checkout notify Consultant.

3.08 ACCEPTANCE TESTING

- A. Contractor shall demonstrate operation of each component of the systems to the Consultant and Owner's representative. Written notice shall be at least ten days prior to that date.
- B. In case the need for further adjustments becomes evident during the demonstration and testing, Contractor's work shall be continued until the systems operate properly. In case the need for further adjustments becomes evident during the demonstration and testing, the Contractor's work shall be continued until the systems operate properly.
- C. When Final Acceptance testing has concluded to the Owner and Consultant's satisfaction, Contractor shall submit a written request for Final Acceptance. Guarantees, warranties and service contracts will continue upon written notification of Final Acceptance by the Consultant.

3.09 INSTRUCTION

- A. Within two working weeks of system acceptance, the Contractor shall commence a series of training sessions for persons designated by the Owner. A total of eight (8) hours of training, at mutually acceptable times, shall be provided during a four week period. Contractor shall submit names and period of attendance of those instructed.

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.

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 will 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 MANUFACTURERS

- A. EDWARDS SYSTEMS TECHNOLOGY (Existing)

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 System Technology model EST3 (Existing)

2.06 PERIPHERAL DEVICES

- A. The pull station shall be compatible with existing fire alarm control panel. Red LEXAN or metal, and finished in red with molded raised letter operating instruction of contrasting color. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common with control units.
- B. Lexan Protective Shield shall be STI Stopper II with tamperproof, clear LEXAN shield and red frame that easily fits over manual pull stations. When shield is lifted to gain access to the station. A battery powered piercing warning horn shall be activated. The horn shall be silenced by lowering and realigning the shield. The horn shall provide 85dB at 10 feet and shall be powered by a 9 VDC battery. All manual pull stations in public areas shall be provided with protective shield.

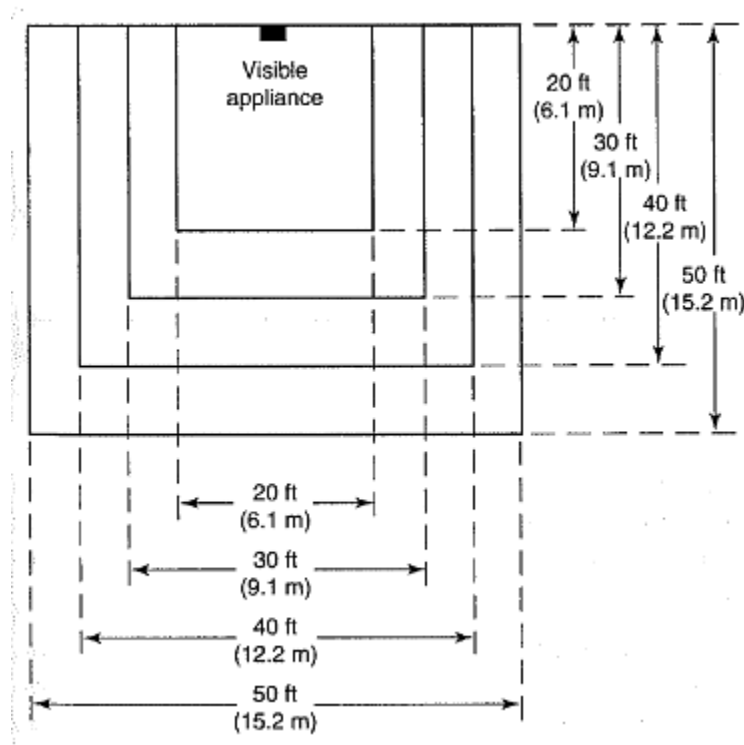
2.07 ANNUNCIATION (NOTIFICATION) DEVICES

- 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 below:

<i>Maximum Room Size</i>		<i>Minimum Required Light Output [Effective Intensity (cd)]</i>		
		<i>One Light per Room</i>	<i>Two Lights per Room (Located on Opposite Walls)</i>	<i>Four Lights per Room (One Light per Wall)</i>
<i>ft</i>	<i>m</i>			
20 × 20	6.10 × 6.10	15	NA	NA
28 × 28	8.53 × 8.53	30	Unknown	NA
30 × 30	9.14 × 9.14	34	15	NA
40 × 40	12.2 × 12.2	60	30	15
45 × 45	13.7 × 13.7	75	Unknown	19
50 × 50	15.2 × 15.2	94	60	30
54 × 54	16.5 × 16.5	110	Unknown	30
55 × 55	16.8 × 16.8	115	Unknown	28
60 × 60	18.3 × 18.3	135	95	30
63 × 63	19.2 × 19.2	150	Unknown	37
68 × 68	20.7 × 20.7	177	Unknown	43
70 × 70	21.3 × 21.3	184	95	60
80 × 80	24.4 × 24.4	240	135	60
90 × 90	27.4 × 27.4	304	185	95
100 × 100	30.5 × 30.5	375	240	95
110 × 110	33.5 × 33.5	455	240	135
120 × 120	36.6 × 36.6	540	305	135
130 × 130	39.6 × 39.6	635	375	185



- 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.

2.08 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. Type: Smoke sensors shall be of the photoelectric type where acceptable per manufacturer specifications ionization type sensors may be used.

2.09 COMBINATION SMOKE AND CARBON MONOXIDE DETECTOR WITH SOUNDER BASE

- A. Combination Smoke and Carbon Monoxide Detector with sounder base shall be compatible with the existing fire alarm control panel as stated in the installation manuals and shall be addressable with integral sounder base.
- B. New devices shall be provided with a sounder base.
- C. Carbon monoxide detector shall be provided an individual addressable module as required to interface with the FACP.
- D. When carbon monoxide detector has reached the end of its usable life a trouble condition shall be signaled at the FACP / remote annunciators.
- E. When a carbon monoxide sensor is in alarm, that carbon monoxide sounder base only shall sound a 'Temporal 4' code pattern, an alarm shall sound at the panel, and central station shall be notified.

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

REPORT OF ENVIRONMENTAL SERVICES

Performed at:

**FARRAGUT MIDDLE SCHOOL/
HASTINGS HIGH SCHOOL
27 FARRAGUT AVE./
1 HOPE BLVD.
HASTINGS-ON-HUDSON, NY 10706**



Prepared for:



**Hastings-on-Hudson Union Free School District
27 Farragut Ave.
Hastings-on-Hudson, NY 10706**

Prepared by:



**565 Taxter Road, 5th Floor
Elmsford, New York 10523
Tel. (914) 798-3710
Fax (914) 592-1734**

**Project No. LE2043479.28
Submission Date: January 15, 2020**



January 15, 2020

Mr. Joseph A. Martorana
Director of Facilities
Hastings-on-Hudson Union Free School District
27 Farragut Avenue
Hastings-on-Hudson, NY 10706

**Subject: Report of Environmental Services
Farragut Middle School
27 Farragut Ave./1 Hope Blvd.
Hastings-on-Hudson, NY 10706**

Dear Mr. Martorana:

WSP has completed a building material inspection at the Farragut Middle School/Hastings High School located at 27 Farragut Avenue/1 Hope Blvd., Hastings-on-Hudson, NY 10706. The inspection included visual observation, material sampling, and laboratory sample analysis of suspect Asbestos-Containing Materials (ACM), Lead Based Paints (LBP) and Polychlorinated-Biphenyls (PCBs) as part of the school district's proposed Interior and Exterior Upgrade Project.

The attached report presents descriptions and results of the material sampling procedures and visual analysis. Relevant general project information is provided, followed by our findings, assessments and recommendations. Laboratory analysis data and certifications are provided in the Appendices.

If you have any questions concerning this report or if we may be of further assistance to you, please contact us.

Sincerely,

WSP

A handwritten signature in blue ink, appearing to read 'CN' or similar initials, followed by a long horizontal stroke.

Craig Napolitano, CHMM
Vice President, Hazmat & IH Services



Report for Environmental Inspection Services

TABLE OF CONTENTS

	Page
1.0 EXECUTIVE SUMMARY	1
2.0 FIELD INSPECTION PROCEDURES AND SAMPLE ANALYSIS METHODS	9
3.0 INSPECTION SCOPE AND MATERIAL ASSESSMENT	12
4.0 INSPECTION RESULTS.....	23
5.0 AREAS NOT ACCESSIBLE.....	30
6.0 CONCLUSIONS AND RECOMMENDATIONS	31
7.0 REPORT CERTIFICATIONS	31

Appendices

Appendix A: Asbestos Sample Analysis Results in Tabular Form

Appendix B: Asbestos Bulk Sample Chain of Custody & Laboratory Results

Appendix C: Asbestos Bulk Sample Location Drawings

Appendix D: Asbestos Containing Materials Location Drawings

Appendix E: Lead XRF Analysis Results

Appendix F: PCB Bulk Sample Chain of Custody & Laboratory Results

Appendix G: Company & Personnel Certifications & Laboratory Accreditations

Appendix H: Photographic Documentation



Report for Environmental Inspection Services

1.0 EXECUTIVE SUMMARY

WSP has performed a building material inspection for the presence or absence of Asbestos-Containing Materials (ACM), Lead Based Paints (LBP) and Polychlorinated-Biphenyls (PCBs) at the Farragut Middle School/Hastings High School located at 27 Farragut Avenue/1 Hope Blvd., Hastings-on-Hudson, NY 10706. The intent of this inspection was to screen for Asbestos-Containing Materials (ACM), Lead Based Paint (LBP) and Polychlorinated-Biphenyls (PCBs) as part of the school district's proposed Interior & Exterior Upgrade Project.

Marvin Luccioni & Luis Nevarez of WSP performed this inspection on November 4, 2019, December 27 & 30, 2019 and January 8, 2020. Mr. Luccioni is licensed as a New York State Department of Labor (NYSDOL) Asbestos Inspector (Cert# 03-11021) and New York State EPA as a Lead Inspector (Cert# NY-I-11928-2). Mr. Nevarez is licensed as a New York State Department of Labor (NYSDOL) Asbestos Inspector (Cert# 12-12740).

The results of the visual inspection and bulk sample analysis determined that the following suspect ACM, LBP and PCB materials may be impacted as part of the school district's proposed Interior & Exterior Upgrade Project:

A. ASBESTOS-CONTAINING MATERIAL

Analytical results of the bulk samples collected by WSP on 11/4/19, 12/27 & 30, 2019 & 01/8/2020 indicate that the following materials **contain asbestos** (greater than 1-percent).

- **Sealant to Fume Hatch, Gray (Boiler Room)**
- **Sink Undercoating, Pink**
- **Beige Floor Tiles (Bottom & 2nd Layers, Room 308)**
- **12"x12" White Floor Tiles (Top Layer, Contaminated ACM, Room 308)**
- **Leveling Compound, Gray (Bottom Layer, Room 107)**
- **12"x12" Beige Floor Tiles (Top Layer, Contaminated ACM, Room 107)**
- **Gray Floor Tiles (Bottom Layer, Room 106)**
- **12"x12" Beige Floor Tiles (Top Layer, Contaminated ACM, Room 106)**
- **12"x12" Brown Floor Tiles (Room 203)**
- **Brown Vinyl Flooring (Room 203A)**
- **12"x12" Red & 12"x12" Black Floor Tiles & Mastic, Black (Room 140)**
- **9"x9" Floor Tiles (Weight Room)**

Analytical results of the bulk samples collected by WSP on 12/27/19 indicate that the following materials **contain asbestos** (greater than 1-percent).

- **Mastic associated with Brown Floor Tiles, Black (Bottom Layer)**
- **Brown Floor Tiles (2nd Layer)**
- **Carpet Mastic, Yellow (Top Layer, Contaminated ACM)**
- **12"x12" Brown with Spots Floor Tiles**



Report for Environmental Inspection Services

- **Mastic associated with Gray Floor Tiles, Black (Bottom Layer)**
- **Gray Floor Tiles (Bottom Layer)**
- **Mastic associated with Brown Floor Tiles (4th Layer)**
- **Brown Floor Tiles (3rd Layer)**
- **Mastic associated with 12"x12" Beige Floor Tiles, Yellow (2nd Layer, Contaminated ACM)**
- **12"x12" Beige Floor Tiles (Top Layer, Contaminated ACM)**
- **Mastic associated with Brown Floor Tiles, Black (Bottom Layer)**
- **Brown Floor Tiles (2nd Layer)**
- **Leveling Compound, Gray (Contaminated ACM)**

Analytical results of the bulk samples collected by WSP on 10/31/18 & 11/06/18 indicate that the following materials **contain asbestos** (greater than 1-percent).

- **Corrugated Heater Insulation, Gray (Auditorium)**
- **Vapor Barrier on Exterior Wall, Black (Auditorium)**

The following materials were assumed to **contain asbestos**.

- **Braided Electrical Wiring (Auditorium Closet)**

As per the 2019 AHERA, the following materials **contain asbestos**.

- **Pipe Lagging/Pipe Insulation**
- **9"x9" Tan Floor Tiles**
- **9"x9" Brown Floor Tiles**
- **12"x12" Maroon Floor Tiles**
- **9"x9" Gray Floor Tiles**
- **12"x12" Cream Floor Tiles**
- **9"x9" Green Floor Tiles**
- **Duct Insulation**
- **Ceiling Plaster, White & Brown Coats (HS Auditorium)**
- **Wall Plaster, White & Brown Coats (HS Auditorium)**
- **Balcony Overhang Ceiling Plaster, Brown Coat (HS Auditorium)**
- **Soffit Acoustical Coating (HS Auditorium)**
- **Carpet Mastic (HS Auditorium)**
- **Interior Door Frame Caulking, Gray**

Analytical results of the bulk samples collected by WSP on 11/4/19, 12/27 & 30/19 & 1/8/20 indicate that the following materials **did not contain asbestos** (less than 1-percent);

- **Cementitious Boiler Insulation, Gray**
- **Fire Brick/Mortar, Red**
- **Soft Insulation, White**



Report for Environmental Inspection Services

- Canvas associated with Fiberglass Pipe Insulation, White
- Gasket to Boiler Hatch, White
- Sealant to Duct Work & Boiler Hatch, Red
- Sealant to Fiberglass Pipe Insulation, White
- Paint on Pump to Boilers 1 & 2, Green
- Exterior Rollup Caulking, Gray
- Sink Undercoating, White
- Mastic associated with 4" Beige Cove Base, Cream
- Mastic associated with 4" Brown Cove Base, Brown
- Mastic associated with 4" Gray Cove Base, Tan
- Terrazzo Flooring, Multi Colored
- Mastic associated with 12"x12" Beige Floor Tiles, Yellow
- 12"x12" Beige Floor Tiles
- Mastic associated with 12"x12" Salmon Floor Tiles, Yellow
- 12"x12" Salmon Floor Tiles
- Mastic associated with 12"x12" Beige Floor Tiles, Black
- 12"x12" Beige Floor Tiles
- Leveling Compound under Wood, Gray/White (Bottom Layer)
- Mastic associated with 12"x12" Salmon Floor Tiles, Brown (Top Layer)
- 12"x12" Salmon Floor Tiles (Top Layer)
- Mastic associated with 12"x12" Beige Floor Tiles with Brown Spots Floor Tiles, Black (Bottom Layer)
- Beige Floor Tiles with Brown Spots (Bottom Layer)
- Mastic associated with 12"x12" Beige Floor Tiles with Brown Spots Floor Tiles, Yellow (2nd Layer)
- Beige Floor Tiles with Brown Spots (2nd Layer)
- Mastic associated with Beige Floor Tiles, Black
- Leveling Compound, Brown (Bottom Layer)
- Mastic associated with 9"x9" Floor Tiles (2nd Layer)
- Mastic associated with Gray Floor Tiles, Black (Bottom Layer)
- Mastic associated with 12"x12" Brown Floor Tiles, Black
- Mastic associated with 12"x12" Beige Spec Floor Tiles, Yellow
- 12"x12" Beige Spec Floor Tiles
- 12"x12" Turquoise Floor Tiles
- Mastic associated with Brown Vinyl Flooring, Orange
- 12"x12" Green Floor Tiles (Mastic Homogeneous with 12"x12" White Floor Tiles)
- Coping Stone Mortar, Gray
- Roof Seam Tar, Black
- Parapet Brick Mortar, Beige
- Chimney Brick Mortar, Beige
- Duct Insulation Tar Paper, Black
- Pitch Pocket Tar, Black



Report for Environmental Inspection Services

- Fascia & Coping Stone Caulking, Beige
- Perimeter Cap Flash Caulking, Gray
- Roofing Membrane & Tar, Black
- Felt Paper to Foam, Black (Bottom Layer)
- Perlite Insulation, (2nd Layer)
- Roofing Membrane, Black (Top Layer)
- Tar, Black (Bottom Layer)
- Scrim Fabric, Black
- Perimeter Cap Flashing Membrane Tar, Black
- Curb Flashing, Black

Analytical results of the bulk samples collected by WSP on 12/27/19 indicate that the following materials **did not contain asbestos** (less than 1-percent);

- Glue Dots associated with 1'x1' Ceiling Tiles, Brown
- Mastic associated with 4" Brown Cove Base, Brown
- Mastic associated with 4" Black Cove Base, Beige
- Mastic associated with 12"x12" Brown with Spots Floor Tiles, Brown

Analytical results of the bulk samples collected by WSP on 10/31/18 & 11/06/18 indicate that the following materials **did not contain asbestos** (less than 1-percent);

- Wall Plaster, White & Brown Coats (Auditorium Stage)
- Horsehair Pipe Insulation, Brown (Auditorium Stage)
- Canvas over Horsehair Pipe Insulation, White (Auditorium Stage)
- Stage Curtain, Green (Auditorium Stage)
- Stage Curtain, Black (Auditorium Stage)
- Vapor Barrier, Black (Auditorium Stage, under stage)
- Cementitious Slab, Gray (Auditorium Stage, under stage)
- Paint on Wood, Black (Auditorium Stage, under stage)
- Joint Compound, White (Elevator Lobby, Old Lobby & Old Lobby Office)
- Drywall, Gray (Elevator Lobby, Old Lobby & Old Lobby Office)
- Glazed Block Mortar, Gray (Elevator Lobby)
- Wall Plaster, White & Brown Coats (Old Lobby & Old Lobby Office)
- Mastic associated with 4" Black Cove Base, White (Old Lobby & Old Lobby Office)
- Ceiling Plaster, White & Brown Coats (Old Lobby & Old Lobby Office)
- Wall Plaster, White & Brown Coats (Auditorium)
- Carpet Mastic, Yellow (Auditorium)
- Cement under Wood Floor, Gray (Auditorium)
- Cloth behind Compressed Board, Gray (Auditorium)
- Compressed Board, Brown (Auditorium)
- Ceiling Plaster, White & Brown Coats (Auditorium)
- Spray-on Fireproofing, Brown (Auditorium Attic)



Report for Environmental Inspection Services

- Pyro Bar Ceiling, White (Auditorium Attic)
- Cinderblock Mortar, Gray (Auditorium Attic)
- Vibration Cloth, Brown (Auditorium 2nd Level Fan Rooms)
- Mastic associated with 6" Black Cove Base, Cream (Auditorium 2nd Level Sound Booth)
- Carpet Mastic, Green (Auditorium 2nd Level Sound Booth)
- Ceiling Plaster, Brown Coat Only (Auditorium 2nd Level)
- Wall Plaster, White & Brown Coats (Auditorium 2nd Level & Spiral Staircase)

As per the 2019 AHERA, the following materials **did not contain asbestos**.

- 2'x2' Pinhole Ceiling Tiles
- 2'x4' Fissure Ceiling Tiles
- 2'x4' Split Fissure Ceiling Tiles
- 1'x1' Ceiling Tiles
- 2'x2' Fissure Ceiling Tiles
- 2'x4' Heavy Gauged Ceiling Tiles
- 2'x2' Gypsum Ceiling Tiles
- 2'x2' Tectum Ceiling Tiles
- Glazed Block Mortar, Gray
- Sink/Toilet Caulking, White
- Drywall, White/Gray
- Joint Compound associated with Drywall, White
- Caulking to Counter Top, Cream
- Scratch Coat Wall/Ceiling Material, Gray
- Ceramic Floor Tile Mortar, Gray
- Pipe Gasket/Caulking, Brown
- Brick Mortar, Gray
- Terracotta Mortar, Gray
- Curtains
- Ceiling Plaster, White & Brown Coats
- 1'x1' Pinhole Ceiling Tiles
- Wall Panel Board
- Interior Door Frame Caulking, White
- Interior Window Glazing to Door
- Tar Paper to Wood Stage, Black
- 18"x18" Green Floor Tiles & Mastic
- 12"x12" Burgundy Floor Tiles & Mastic
- Ceramic Floor Tile Mortar, Gray
- 6" Gray Cove Base Mastic
- Wall Plaster, White & Brown Coats
- Horsehair Pipe Insulation, Brown
- Canvas over Horsehair Pipe Insulation, White



Report for Environmental Inspection Services

- Stage Curtains, Green/Black
- Vapor Barrier under Stage, Black
- Cementitious Slab under Stage, Gray
- Paint on Wood, Black
- 4" Black Cove Base Mastic, Cream
- Ceiling Plaster, White & Brown Coats
- Carpet Mastic, Yellow
- Cement under Wood Floor, Gray
- Cloth behind Compressed Board, Gray
- Compressed Board, Brown
- Spray-on Fireproofing, Brown
- Pyro Bar Ceiling, White
- Cinderblock Mortar, Gray
- Vibration Cloth, Brown
- Carpet Mastic, Green
- Felt Paper under Wood Floor, Black
- Waterproofing under Wood Floor, Black

B. LEAD-BASED PAINT

Based upon XRF readings performed on 11/06/18, lead has been confirmed to exist in the following tested combinations:

- **Orange Wood Wall Trim (Auditorium)**
- **Green Wood Doors (Auditorium)**
- **Green Metal Recessed Wall Heaters (Auditorium)**
- **Green Wood Door (Auditorium Closet)**
- **Black Wood Cove Base (Auditorium & Stage)**
- **Varnish Metal Hand Rail (Auditorium Stage)**
- **Black Metal Door Frame (Old Lobby)**
- **Black Metal Spiral Stairs (Staircase)**
- **Brown Wood Door (Auditorium 2nd Level Sound Booth)**
- **Red Metal Fire Hose Case (Old Lobby Office)**

Based upon XRF readings performed on 1/8/20, lead was **not detected** in the following tested combinations via XRF readings:

- Blue Plaster Wall
- Yellow Plaster Wall
- Yellow Drywall Wall
- Brown Metal Door
- Brown Metal Door Frame
- Beige Plaster Wall



Report for Environmental Inspection Services

Based upon XRF readings performed on 12/27/19, lead was **not detected** in the following tested combinations via XRF readings:

- Blue Drywall Wall (Music Suite)
- White Metal Door Frame (Music Suite)
- Gray Metal Door Frame (Music Suite)
- Green Metal Door Frame (Music Suite)
- White Plaster Wall (Music Suite)
- Brown Metal Door Frame (Music Suite)
- Beige Drywall Wall (Music Suite)
- White Drywall Wall (Music Suite)

Based upon XRF readings performed on 11/06/18, lead was **not detected** in the following tested combinations via XRF readings:

- Green Wood Lower Wall (Auditorium)
- Beige Plaster Upper Wall (Auditorium)
- Black Wood Door Frame (Auditorium)
- White Plaster Wall (Auditorium Closet)
- White Plaster Ceiling (Auditorium Closet)
- White Metal Recessed Ceiling Heater (Auditorium Closet)
- Black Wood Door Frame (Auditorium Closet)
- Yellow Wood Columns (Auditorium Stage)
- Black Plaster Wall (Auditorium Stage)
- Varnish Wood Door Frame (Auditorium Stage)
- Varnish Wood Door (Auditorium Stage)
- Black Metal Conduit (Auditorium Stage)
- Black Metal Pipe (Auditorium Stage)
- Beige Metal Speakers (Auditorium Stage)
- Varnish Wood Floor (Auditorium Stage)
- Green Metal Chair Frames (Auditorium)
- Varnish Wood Chairs (Auditorium)
- Varnish Wood Floor (Auditorium)
- Gray Wood Cove Base (Foyer o/s Elevator Lobby)
- Gray Plaster Wall (Foyer o/s Elevator Lobby)
- White Plaster Ceiling (Foyer o/s Elevator Lobby)
- White Metal Recessed Ceiling Heater (Foyer o/s Elevator Lobby)
- White Drywall Wall (Foyer o/s Elevator Lobby)
- Gray Wood Door Frame (Foyer o/s Elevator Lobby)
- Varnish Wood Door (Foyer o/s Elevator Lobby)
- Gray Drywall Wall (Elevator Lobby)



Report for Environmental Inspection Services

- White Drywall Ceiling (Elevator Lobby)
- Black Wood Cove Base (Old Lobby & Old Lobby Office)
- White Plaster Wall (Old Lobby & Old Lobby Office)
- White Plaster Ceiling (Old Lobby & Old Lobby Office)
- Black Metal Exterior Door Frame (Old Lobby & Old Lobby Office)
- Green Metal Doors (Old Lobby)
- Blue Drywall Wall (Old Lobby Office)
- Blue Plaster Wall (Old Lobby Office)
- Black Metal Recessed Heaters (Old Lobby Office)
- Black Metal Door Frame (Old Lobby Office)
- Black Wood Door (Old Lobby Office)
- Beige Plaster Wall (Spiral Staircase)
- Yellow Plaster Wall (Auditorium 2nd Level Sound Booth)
- Yellow Wood Wall (Auditorium 2nd Level Sound Booth)
- White Concrete Ceiling (Auditorium 2nd Level Sound Booth)
- White Plaster Ceiling (Auditorium)
- Brown Wood Door Frame (Auditorium 2nd Level Sound Booth)
- Brown Wood Door (Auditorium 2nd Level Sound Booth)
- Black Metal Door Frame (Old Lobby Office)
- Black Metal Door (Old Lobby Office)

C. PCB-CONTAINING MATERIAL

Analytical results of the bulk samples collected indicate that the following materials **contain PCB** (greater than 50 PPM).

- **Pending Results**

Analytical results of the bulk samples collected indicate that the following materials **did not contain PCB** (less than 50 PPM);

- Coping Stone Caulking, Gray
- Cap Flash Caulking, Gray



Report for Environmental Inspection Services

2.0 FIELD INSPECTION PROCEDURES AND SAMPLE ANALYSIS METHODS

ASBESTOS-CONTAINING MATERIAL

Guidelines used for the inspection were established by the Environmental Protection Agency (EPA) in the Guidance for Controlling Asbestos Containing Materials in Buildings, Office of Pesticides and Toxic Substances, Doc 560/5-85-024, and 40 CFR Part 763, Asbestos Hazard Emergency Response Act (AHERA)

Field information was organized in accordance with the AHERA methodology of homogenous area (HA). During the Inspection, reasonable effort was made to identify all locations and types of ACM materials associated with the scope of work. Sampling has included multiple samples of the same materials chosen at random. However, due to inconsistencies of a manufacturer's processes and the contractor's installation methods, materials of similar construction may contain various amounts of asbestos. Furthermore, some materials that were not originally specified to contain asbestos may in fact contain this mineral. For example, cementitious pipe insulation and plaster were frequently mixed with asbestos at the construction site for ease of application. Locating all asbestos materials can only be definitively achieved by conducting exploratory demolition and sampling every section of pipe insulation, fitting or valve covering, fireproofing, and other suspect ACM.

Bulk samples of suspect ACM are analyzed using polarized light microscopy (PLM) coupled with dispersion staining, as described in 40 CFR Part 763 and the National Emissions Standard for Hazardous Air Pollutants (NESHAPS). NESHAPS is the standard industry protocol for the determination of asbestos in building materials. A suspect material is immersed in a solution of known refractive index and subjected to illumination by polarized light. The color displays that result are compared to a standardized atlas whereby the specific variety of asbestos is determined. It should also be recognized that PLM is primarily a qualitative identification method whereby asbestos percentage, if any, is estimated. While EPA, New York State, and New York City regulations governing ACM consider materials containing greater than 1-percent as asbestos, accurately quantifying asbestos content below 5-percent has been shown to be unreliable.

The New York State Department of Health has recently revised the PLM Stratified Point Counting Method. The March 25th, 2011 method, "Polarized Light Microscopy Methods for Identifying and Quantifying Asbestos in Bulk Samples" can be found as Item 198.1 in the Environmental Laboratory Approval program (ELAP) Certification manual. Whereas the procedure of analysis for bulk samples that fall into the category of "Non-friable Organically Bound" (NOB) can be found in the March 25th 2011 method "Polarized-Light Microscope Method for Identifying and Quantifying Asbestos in Non-Friable Organically Bound Bulk Samples", Item 198.6 in the ELAP Certification Manual. This category includes any sample in a flexible to rigid asphalt or vinyl matrix (floor tiles, mastic, roofing shingles, roofing felt, etc.). These samples must be "ashed" in a muffle furnace at 480-degrees Celsius (to remove organic matrix), treated with acid (to remove any mineral carbonate), and filtered through a 0.4-micron polycarbonate filter before being analyzed by PLM. The sample must be weighted between each of these steps to track the percent loss of organic matrix.



Report for Environmental Inspection Services

ELAP has determined that analysis of NOB materials is not reliably performed by PLM. Therefore, if PLM analysis yields results of 1-percent asbestos or less, the result must be confirmed by TEM. For bulk samples that undergo TEM analysis, the March 25th, 2011 method "Transmission Electron Microscope Method for Identifying and Quantitating Asbestos in Non-Friable organically Bound Bulk Samples" must be used and can be found as Item 198.4 in the ELAP Certification Manual. ELAP certified laboratories must include the following statement with their PLM analysis results for each "negative" (1-percent or less asbestos) NOB sample: "Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Before this material can be considered or treated as non-ACM, confirmation must be made by quantitative transmission electron microscopy".

All samples are initially analyzed by Polarized Light Microscopy in accordance with Item 198.1 and 198.6 of the ELAP Certification Manual. Samples which yield a negative PLM result and which are classified as a "non-friable" material, are then re-analyzed utilizing TEM methodology in accordance with Item 198.4 of the ELAP Certification Manual. The laboratory performing both these analysis procedures is EMSL located at 528 Mineola Ave., Carle Place, NY 11514. The laboratory has received accreditation from the following agencies:

- National Voluntary Laboratory Accreditation Program (Lab Code 101048-10)
- New York State Environmental Laboratory Approval Program (Lab No. 11469 & 11236)
- American Industrial Hygiene Association Accredited Laboratory (Lab No. 102344)

LEAD-BASED PAINT

LB's U.S. EPA licensed NY State Lead Inspector performed a lead-based paint inspection characterized by a surface by surface visual inspection of accessible areas which may potentially be impacted by any future renovations. Painted surfaces were visually inspected, and coatings were analyzed for lead based paint using an XRF Spectrum Analyzer.

Information obtained during the inspection is compared to the United States Department of Housing and Urban Development's lead paint threshold. HUD states that paint containing equal to or greater than 1.0 micrograms per centimeter squared ($\geq 1.0 \text{ mg/cm}^2$), or 5,000 parts per million (0.5% by weight) or more of lead is to be considered Lead Based Paint (LBP).

The readings of paint surfaces were taken using an RMD LPA-1 XRF Lead Paint Spectrum Analyzer. The LPA-1 method of measurement is based on the spectrometric analysis of lead K-shell X-ray fluorescence within a controlled depth of interrogation. The LPA-1 Analyzer uses a Co-57 radioactive source and an advanced, solid-state, room temperature, radiation detector to generate and detect the x-ray fluorescence spectrum of a painted surface. The spectrum is then analyzed by a microprocessor to eliminate the effects of substrate and other factors such as scattering to allow an accurate determination of the amount of lead on a surface. The LPA-1 automatically analyzes spectrometric data in real time and differentiates the lead signal from the spectrum. The x-ray fluorescence properties are determined through calibration process and are



Report for Environmental Inspection Services

used for automatic substrate correction and calculation of the lead content of a painted surface.

Any work which disturbs painted surfaces containing lead shall be performed in accordance with the Occupational Safety and Health Administrations (OSHA) 29 CFR 1926.62 (Lead in Construction Standard) and EPA's 40 CFR 745 regulations. Personal air monitoring should be conducted when disturbing lead-based paints and lead containing materials as per 29 CFR 1926.62 (OSHA).

In addition, all waste generated as part of this project, regardless of the lead content in the paint, should be tested in accordance with the EPA Resource Conservation and Recovery Act (RCRA) to determine the classification of the waste. Under RCRA, any waste material that, when tested by Toxicity Characteristics Leaching Procedure (TCLP), results in a leachate lead concentration of five (5) parts per million or greater must be disposed of at an EPA licensed hazardous waste facility.

POLYCHLORINATED BIPHENYLS (PCBs)

PCBs belong to a broad family of man-made organic chemicals known as chlorinated hydrocarbons. PCBs were domestically manufactured from 1929 until their manufacture was banned in 1979. They have a range of toxicity and vary in consistency from thin, light-colored liquids to yellow or black waxy solids. Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper; and many other industrial applications.

Although no longer commercially produced in the United States, PCBs may be present in products and materials produced before the 1979 PCB ban. Products that may contain PCBs include: Transformers and capacitors, Oil used in motors and hydraulic systems, Fluorescent light ballasts, Adhesives and tapes, Caulking, Plastics, etc.

The PCBs used in these products were chemical mixtures made up of a variety of individual chlorinated biphenyl components, known as congeners. Most commercial PCB mixtures are known in the United States by their industrial trade names. The most common trade name is aroclor.

Polychlorinated biphenyls (PCBs) are regulated pursuant to the United States Environmental Protection Agency Code of Federal Regulations (40 CFR Part 761), the Toxic Substances Control Act (TSCA – 15 U.S.C. 2605), New York State Department of Environmental Conservation 6NYCRR 370-376 and federal Occupational Safety and Health Administration (OSHA) 29CFR 1926 & 1910. These regulations require certain testing and reporting requirements to determine management, recycling and disposal options for PCBs.



Report for Environmental Inspection Services

3.0 INSPECTION SCOPE AND MATERIAL ASSESSMENT

The areas inspected for ACM, LBP and PCB materials that may be impacted as part of the school district's proposed Interior & Exterior Upgrade Project include:

- Throughout Interior
- Exterior Façade
- Roofs A through N

A. ASBESTOS-CONTAINING MATERIAL

Materials examined during the WSP inspection included:

- Sealant to Fume Hatch, Gray (Boiler Room)
- Sink Undercoating, Pink
- Beige Floor Tiles (Bottom & 2nd Layers, Room 308)
- 12"x12" White Floor Tiles (Top Layer, Contaminated ACM, Room 308)
- Leveling Compound, Gray (Bottom Layer, Room 107)
- 12"x12" Beige Floor Tiles (Top Layer, Contaminated ACM, Room 107)
- Gray Floor Tiles (Bottom Layer, Room 106)
- 12"x12" Beige Floor Tiles (Top Layer, Contaminated ACM, Room 106)
- 12"x12" Brown Floor Tiles (Room 203)
- Brown Vinyl Flooring (Room 203A)
- 12"x12" Red & 12"x12" Black Floor Tiles & Mastic, Black (Room 140)
- 9"x9" Floor Tiles (Weight Room)
- Cementitious Boiler Insulation, Gray
- Fire Brick/Mortar, Red
- Soft Insulation, White
- Canvas associated with Fiberglass Pipe Insulation, White
- Gasket to Boiler Hatch, White
- Sealant to Duct Work & Boiler Hatch, Red
- Sealant to Fiberglass Pipe Insulation, White
- Paint on Pump to Boilers 1 & 2, Green
- Exterior Rollup Caulking, Gray
- Sink Undercoating, White
- Mastic associated with 4" Beige Cove Base, Cream
- Mastic associated with 4" Brown Cove Base, Brown
- Mastic associated with 4" Gray Cove Base, Tan
- Terrazzo Flooring, Multi Colored
- Mastic associated with 12"x12" Beige Floor Tiles, Yellow
- 12"x12" Beige Floor Tiles
- Mastic associated with 12"x12" Salmon Floor Tiles, Yellow



Report for Environmental Inspection Services

- 12"x12" Salmon Floor Tiles
- Mastix associated with 12"x12" Beige Floor Tiles, Black
- 12"x12" Beige Floor Tiles
- Leveling Compound under Wood, Gray/White (Bottom Layer)
- Mastix associated with 12"x12" Salmon Floor Tiles, Brown (Top Layer)
- 12"x12" Salmon Floor Tiles (Top Layer)
- Mastix associated with 12"x12" Beige Floor Tiles with Brown Spots Floor Tiles, Black (Bottom Layer)
- Beige Floor Tiles with Brown Spots (Bottom Layer)
- Mastix associated with 12"x12" Beige Floor Tiles with Brown Spots Floor Tiles, Yellow (2nd Layer)
- Beige Floor Tiles with Brown Spots (2nd Layer)
- Mastix associated with Beige Floor Tiles, Black
- Leveling Compound, Brown (Bottom Layer)
- Mastix associated with 9"x9" Floor Tiles (2nd Layer)
- Mastix associated with Gray Floor Tiles, Black (Bottom Layer)
- Mastix associated with 12"x12" Brown Floor Tiles, Black
- Mastix associated with 12"x12" Beige Spec Floor Tiles, Yellow
- 12"x12" Beige Spec Floor Tiles
- 12"x12" Turquoise Floor Tiles
- Mastix associated with Brown Vinyl Flooring, Orange
- 12"x12" Green Floor Tiles (Mastix Homogeneous with 12"x12" White Floor Tiles)
- Coping Stone Mortar, Gray
- Roof Seam Tar, Black
- Parapet Brick Mortar, Beige
- Chimney Brick Mortar, Beige
- Duct Insulation Tar Paper, Black
- Pitch Pocket Tar, Black
- Fascia & Coping Stone Caulking, Beige
- Perimeter Cap Flash Caulking, Gray
- Roofing Membrane & Tar, Black
- Felt Paper to Foam, Black (Bottom Layer)
- Perlite Insulation, (2nd Layer)
- Roofing Membrane, Black (Top Layer)
- Tar, Black (Bottom Layer)
- Scrim Fabric, Black
- Perimeter Cap Flashing Membrane Tar, Black
- Curb Flashing, Black
- Corrugated Heater Insulation, Gray (Auditorium)
- Vapor Barrier on Exterior Wall, Black (Auditorium)
- Braided Electrical Wiring (Auditorium Closet)
- Glue Dots associated with 1'x1' Ceiling Tiles, Brown



Report for Environmental Inspection Services

- Mastic associated with 4" Brown Cove Base, Brown
- Mastic associated with 4" Black Cove Base, Beige
- Mastic associated with Brown Floor Tiles, Black (Bottom Layer)
- Brown Floor Tiles (2nd Layer)
- Carpet Mastic, Yellow (Top Layer)
- Mastic associated with 12"x12" Brown with Spots Floor Tiles, Brown
- 12"x12" Brown with Spots Floor Tiles
- Mastic associated with Gray Floor Tiles, Black (Bottom Layer)
- Gray Floor Tiles (Bottom Layer)
- Mastic associated with Brown Floor Tiles (4th Layer)
- Brown Floor Tiles (3rd Layer)
- Mastic associated with 12"x12" Beige Floor Tiles, Yellow (2nd Layer)
- 12"x12" Beige Floor Tiles (Top Layer)
- Mastic associated with Brown Floor Tiles, Black (Bottom Layer)
- Brown Floor Tiles (2nd Layer)
- Leveling Compound, Gray
- Wall Plaster, White & Brown Coats (Throughout Interior)
- Horsehair Pipe Insulation, Brown
- Canvas over Horsehair Pipe Insulation, White (Auditorium Stage)
- Stage Curtain, Green (Auditorium Stage)
- Stage Curtain, Black (Auditorium Stage)
- Vapor Barrier, Black (Auditorium Stage, under stage)
- Cementitious Slab, Gray (Auditorium Stage, under stage)
- Paint on Wood, Black (Auditorium Stage, under stage)
- Joint Compound, White (Throughout Interior)
- Drywall, Gray (Throughout Interior)
- Glazed Block Mortar, Gray (Throughout Interior)
- Mastic associated with 4" Black Cove Base, White (Old Lobby & Old Lobby Office)
- Ceiling Plaster, White & Brown Coats (Throughout Interior)
- Carpet Mastic, Yellow (Auditorium)
- Cement under Wood Floor, Gray (Auditorium)
- Cloth behind Compressed Board, Gray (Auditorium)
- Compressed Board, Brown (Auditorium)
- Spray-on Fireproofing, Brown (Auditorium Attic)
- Pyro Bar Ceiling, White (Auditorium Attic)
- Cinderblock Mortar, Gray (Throughout Interior)
- Vibration Cloth, Brown (Auditorium 2nd Level Fan Rooms)
- Mastic associated with 6" Black Cove Base, Cream (Auditorium 2nd Level Sound Booth)
- Carpet Mastic, Green (Auditorium 2nd Level Sound Booth)
- 2'x2' Pinhole Ceiling Tiles
- 2'x4' Fissure Ceiling Tiles
- 2'x4' Split Fissure Ceiling Tiles



Report for Environmental Inspection Services

- 1'x1' Ceiling Tiles
- 2'x2' Fissure Ceiling Tiles
- 2'x4' Heavy Gauged Ceiling Tiles
- 2'x2' Gypsum Ceiling Tiles
- 2'x2' Tectum Ceiling Tiles
- Sink/Toilet Caulking, White
- Caulking to Counter Top, Cream
- Scratch Coat Wall/Ceiling Material, Gray
- Ceramic Floor Tile Mortar, Gray
- Pipe Gasket/Caulking, Brown
- Brick Mortar, Gray (Throughout Interior)
- Terracotta Mortar, Gray
- 1'x1' Pinhole Ceiling Tiles
- Wall Panel Board
- Interior Door Frame Caulking, White
- Interior Window Glazing to Door
- Tar Paper to Wood Stage, Black
- 18"x18" Green Floor Tiles & Mastic
- 12"x12" Burgundy Floor Tiles & Mastic
- Ceramic Floor Tile Mortar, Gray
- 6" Gray Cove Base Mastic
- 4" Black Cove Base Mastic, Cream
- Felt Paper under Wood Floor, Black
- Waterproofing under Wood Floor, Black

A. ASBESTOS-CONTAINING MATERIAL

Analytical results of the bulk samples collected by WSP on 11/4/19, 12/27 & 30, 2019 & 01/8/2020 indicate that the following materials **contain asbestos** (greater than 1-percent).

- **Sealant to Fume Hatch, Gray (Boiler Room)**
- **Sink Undercoating, Pink**
- **Beige Floor Tiles (Bottom & 2nd Layers, Room 308)**
- **12"x12" White Floor Tiles (Top Layer, Contaminated ACM, Room 308)**
- **Leveling Compound, Gray (Bottom Layer, Room 107)**
- **12"x12" Beige Floor Tiles (Top Layer, Contaminated ACM, Room 107)**
- **Gray Floor Tiles (Bottom Layer, Room 106)**
- **12"x12" Beige Floor Tiles (Top Layer, Contaminated ACM, Room 106)**
- **12"x12" Brown Floor Tiles (Room 203)**
- **Brown Vinyl Flooring (Room 203A)**
- **12"x12" Red & 12"x12" Black Floor Tiles & Mastic, Black (Room 140)**
- **9"x9" Floor Tiles (Weight Room)**



Report for Environmental Inspection Services

Analytical results of the bulk samples collected by WSP on 12/27/19 indicate that the following materials **contain asbestos** (greater than 1-percent).

- **Mastic associated with Brown Floor Tiles, Black (Bottom Layer)**
- **Brown Floor Tiles (2nd Layer)**
- **Carpet Mastic, Yellow (Top Layer, Contaminated ACM)**
- **12"x12" Brown with Spots Floor Tiles**
- **Mastic associated with Gray Floor Tiles, Black (Bottom Layer)**
- **Gray Floor Tiles (Bottom Layer)**
- **Mastic associated with Brown Floor Tiles (4th Layer)**
- **Brown Floor Tiles (3rd Layer)**
- **Mastic associated with 12"x12" Beige Floor Tiles, Yellow (2nd Layer, Contaminated ACM)**
- **12"x12" Beige Floor Tiles (Top Layer, Contaminated ACM)**
- **Mastic associated with Brown Floor Tiles, Black (Bottom Layer)**
- **Brown Floor Tiles (2nd Layer)**
- **Leveling Compound, Gray (Contaminated ACM)**

Analytical results of the bulk samples collected by WSP on 10/31/18 & 11/06/18 indicate that the following materials **contain asbestos** (greater than 1-percent).

- **Corrugated Heater Insulation, Gray (Auditorium)**
- **Vapor Barrier on Exterior Wall, Black (Auditorium)**

The following materials were assumed to **contain asbestos**.

- **Braided Electrical Wiring (Auditorium Closet)**

As per the 2019 AHERA, the following materials **contain asbestos**.

- **Pipe Lagging/Pipe Insulation**
- **9"x9" Tan Floor Tiles**
- **9"x9" Brown Floor Tiles**
- **12"x12" Maroon Floor Tiles**
- **9"x9" Gray Floor Tiles**
- **12"x12" Cream Floor Tiles**
- **9"x9" Green Floor Tiles**
- **Duct Insulation**
- **Ceiling Plaster, White & Brown Coats (HS Auditorium)**
- **Wall Plaster, White & Brown Coats (HS Auditorium)**
- **Balcony Overhang Ceiling Plaster, Brown Coat (HS Auditorium)**
- **Soffit Acoustical Coating (HS Auditorium)**
- **Carpet Mastic (HS Auditorium)**



Report for Environmental Inspection Services

- **Interior Door Frame Caulking, Gray**

Analytical results of the bulk samples collected by WSP on 11/4/19, 12/27 & 30/19 & 1/8/20 indicate that the following materials **did not contain asbestos** (less than 1-percent);

- Cementitious Boiler Insulation, Gray
- Fire Brick/Mortar, Red
- Soft Insulation, White
- Canvas associated with Fiberglass Pipe Insulation, White
- Gasket to Boiler Hatch, White
- Sealant to Duct Work & Boiler Hatch, Red
- Sealant to Fiberglass Pipe Insulation, White
- Paint on Pump to Boilers 1 & 2, Green
- Exterior Rollup Caulking, Gray
- Sink Undercoating, White
- Mastic associated with 4" Beige Cove Base, Cream
- Mastic associated with 4" Brown Cove Base, Brown
- Mastic associated with 4" Gray Cove Base, Tan
- Terrazzo Flooring, Multi Colored
- Mastic associated with 12"x12" Beige Floor Tiles, Yellow
- 12"x12" Beige Floor Tiles
- Mastic associated with 12"x12" Salmon Floor Tiles, Yellow
- 12"x12" Salmon Floor Tiles
- Mastic associated with 12"x12" Beige Floor Tiles, Black
- 12"x12" Beige Floor Tiles
- Leveling Compound under Wood, Gray/White (Bottom Layer)
- Mastic associated with 12"x12" Salmon Floor Tiles, Brown (Top Layer)
- 12"x12" Salmon Floor Tiles (Top Layer)
- Mastic associated with 12"x12" Beige Floor Tiles with Brown Spots Floor Tiles, Black (Bottom Layer)
- Beige Floor Tiles with Brown Spots (Bottom Layer)
- Mastic associated with 12"x12" Beige Floor Tiles with Brown Spots Floor Tiles, Yellow (2nd Layer)
- Beige Floor Tiles with Brown Spots (2nd Layer)
- Mastic associated with Beige Floor Tiles, Black
- Leveling Compound, Brown (Bottom Layer)
- Mastic associated with 9"x9" Floor Tiles (2nd Layer)
- Mastic associated with Gray Floor Tiles, Black (Bottom Layer)
- Mastic associated with 12"x12" Brown Floor Tiles, Black
- Mastic associated with 12"x12" Beige Spec Floor Tiles, Yellow
- 12"x12" Beige Spec Floor Tiles
- 12"x12" Turquoise Floor Tiles



Report for Environmental Inspection Services

- Mastic associated with Brown Vinyl Flooring, Orange
- 12"x12" Green Floor Tiles (Mastic Homogeneous with 12"x12" White Floor Tiles)
- Coping Stone Mortar, Gray
- Roof Seam Tar, Black
- Parapet Brick Mortar, Beige
- Chimney Brick Mortar, Beige
- Duct Insulation Tar Paper, Black
- Pitch Pocket Tar, Black
- Fascia & Coping Stone Caulking, Beige
- Perimeter Cap Flash Caulking, Gray
- Roofing Membrane & Tar, Black
- Felt Paper to Foam, Black (Bottom Layer)
- Perlite Insulation, (2nd Layer)
- Roofing Membrane, Black (Top Layer)
- Tar, Black (Bottom Layer)
- Scrim Fabric, Black
- Perimeter Cap Flashing Membrane Tar, Black
- Curb Flashing, Black

Analytical results of the bulk samples collected by WSP on 12/27/19 indicate that the following materials **did not contain asbestos** (less than 1-percent);

- Glue Dots associated with 1'x1' Ceiling Tiles, Brown
- Mastic associated with 4" Brown Cove Base, Brown
- Mastic associated with 4" Black Cove Base, Beige
- Mastic associated with 12"x12" Brown with Spots Floor Tiles, Brown

Analytical results of the bulk samples collected by WSP on 10/31/18 & 11/06/18 indicate that the following materials **did not contain asbestos** (less than 1-percent);

- Wall Plaster, White & Brown Coats (Auditorium Stage)
- Horsehair Pipe Insulation, Brown (Auditorium Stage)
- Canvas over Horsehair Pipe Insulation, White (Auditorium Stage)
- Stage Curtain, Green (Auditorium Stage)
- Stage Curtain, Black (Auditorium Stage)
- Vapor Barrier, Black (Auditorium Stage, under stage)
- Cementitious Slab, Gray (Auditorium Stage, under stage)
- Paint on Wood, Black (Auditorium Stage, under stage)
- Joint Compound, White (Elevator Lobby, Old Lobby & Old Lobby Office)
- Drywall, Gray (Elevator Lobby, Old Lobby & Old Lobby Office)
- Glazed Block Mortar, Gray (Elevator Lobby)
- Wall Plaster, White & Brown Coats (Old Lobby & Old Lobby Office)
- Mastic associated with 4" Black Cove Base, White (Old Lobby & Old Lobby Office)



Report for Environmental Inspection Services

- Ceiling Plaster, White & Brown Coats (Old Lobby & Old Lobby Office)
- Wall Plaster, White & Brown Coats (Auditorium)
- Carpet Mastic, Yellow (Auditorium)
- Cement under Wood Floor, Gray (Auditorium)
- Cloth behind Compressed Board, Gray (Auditorium)
- Compressed Board, Brown (Auditorium)
- Ceiling Plaster, White & Brown Coats (Auditorium)
- Spray-on Fireproofing, Brown (Auditorium Attic)
- Pyro Bar Ceiling, White (Auditorium Attic)
- Cinderblock Mortar, Gray (Auditorium Attic)
- Vibration Cloth, Brown (Auditorium 2nd Level Fan Rooms)
- Mastic associated with 6" Black Cove Base, Cream (Auditorium 2nd Level Sound Booth)
- Carpet Mastic, Green (Auditorium 2nd Level Sound Booth)
- Ceiling Plaster, Brown Coat Only (Auditorium 2nd Level)
- Wall Plaster, White & Brown Coats (Auditorium 2nd Level & Spiral Staircase)

As per the 2019 AHERA, the following materials **did not contain asbestos**.

- 2'x2' Pinhole Ceiling Tiles
- 2'x4' Fissure Ceiling Tiles
- 2'x4' Split Fissure Ceiling Tiles
- 1'x1' Ceiling Tiles
- 2'x2' Fissure Ceiling Tiles
- 2'x4' Heavy Gauged Ceiling Tiles
- 2'x2' Gypsum Ceiling Tiles
- 2'x2' Tectum Ceiling Tiles
- Glazed Block Mortar, Gray
- Sink/Toilet Caulking, White
- Drywall, White/Gray
- Joint Compound associated with Drywall, White
- Caulking to Counter Top, Cream
- Scratch Coat Wall/Ceiling Material, Gray
- Ceramic Floor Tile Mortar, Gray
- Pipe Gasket/Caulking, Brown
- Brick Mortar, Gray
- Terracotta Mortar, Gray
- Curtains
- Ceiling Plaster, White & Brown Coats
- 1'x1' Pinhole Ceiling Tiles
- Wall Panel Board
- Interior Door Frame Caulking, White
- Interior Window Glazing to Door



Report for Environmental Inspection Services

- Tar Paper to Wood Stage, Black
- 18"x18" Green Floor Tiles & Mastic
- 12"x12" Burgundy Floor Tiles & Mastic
- Ceramic Floor Tile Mortar, Gray
- 6" Gray Cove Base Mastic
- Wall Plaster, White & Brown Coats
- Horsehair Pipe Insulation, Brown
- Canvas over Horsehair Pipe Insulation, White
- Stage Curtains, Green/Black
- Vapor Barrier under Stage, Black
- Cementitious Slab under Stage, Gray
- Paint on Wood, Black
- 4" Black Cove Base Mastic, Cream
- Ceiling Plaster, White & Brown Coats
- Carpet Mastic, Yellow
- Cement under Wood Floor, Gray
- Cloth behind Compressed Board, Gray
- Compressed Board, Brown
- Spray-on Fireproofing, Brown
- Pyro Bar Ceiling, White
- Cinderblock Mortar, Gray
- Vibration Cloth, Brown
- Carpet Mastic, Green
- Felt Paper under Wood Floor, Black
- Waterproofing under Wood Floor, Black

B. LEAD-BASED PAINT

Based upon XRF readings performed on 11/06/18, lead has been confirmed to exist in the following tested combinations:

- **Orange Wood Wall Trim (Auditorium)**
- **Green Wood Doors (Auditorium)**
- **Green Metal Recessed Wall Heaters (Auditorium)**
- **Green Wood Door (Auditorium Closet)**
- **Black Wood Cove Base (Auditorium & Stage)**
- **Varnish Metal Hand Rail (Auditorium Stage)**
- **Black Metal Door Frame (Old Lobby)**
- **Black Metal Spiral Stairs (Staircase)**
- **Brown Wood Door (Auditorium 2nd Level Sound Booth)**
- **Red Metal Fire Hose Case (Old Lobby Office)**



Report for Environmental Inspection Services

Based upon XRF readings performed on 1/8/20, lead was **not detected** in the following tested combinations via XRF readings:

- Blue Plaster Wall
- Yellow Plaster Wall
- Yellow Drywall Wall
- Brown Metal Door
- Brown Metal Door Frame
- Beige Plaster Wall

Based upon XRF readings performed on 12/27/19, lead was **not detected** in the following tested combinations via XRF readings:

- Blue Drywall Wall (Music Suite)
- White Metal Door Frame (Music Suite)
- Gray Metal Door Frame (Music Suite)
- Green Metal Door Frame (Music Suite)
- White Plaster Wall (Music Suite)
- Brown Metal Door Frame (Music Suite)
- Beige Drywall Wall (Music Suite)
- White Drywall Wall (Music Suite)

Based upon XRF readings performed on 11/06/18, lead was **not detected** in the following tested combinations via XRF readings:

- Green Wood Lower Wall (Auditorium)
- Beige Plaster Upper Wall (Auditorium)
- Black Wood Door Frame (Auditorium)
- White Plaster Wall (Auditorium Closet)
- White Plaster Ceiling (Auditorium Closet)
- White Metal Recessed Ceiling Heater (Auditorium Closet)
- Black Wood Door Frame (Auditorium Closet)
- Yellow Wood Columns (Auditorium Stage)
- Black Plaster Wall (Auditorium Stage)
- Varnish Wood Door Frame (Auditorium Stage)
- Varnish Wood Door (Auditorium Stage)
- Black Metal Conduit (Auditorium Stage)
- Black Metal Pipe (Auditorium Stage)
- Beige Metal Speakers (Auditorium Stage)
- Varnish Wood Floor (Auditorium Stage)
- Green Metal Chair Frames (Auditorium)
- Varnish Wood Chairs (Auditorium)



Report for Environmental Inspection Services

- Varnish Wood Floor (Auditorium)
- Gray Wood Cove Base (Foyer o/s Elevator Lobby)
- Gray Plaster Wall (Foyer o/s Elevator Lobby)
- White Plaster Ceiling (Foyer o/s Elevator Lobby)
- White Metal Recessed Ceiling Heater (Foyer o/s Elevator Lobby)
- White Drywall Wall (Foyer o/s Elevator Lobby)
- Gray Wood Door Frame (Foyer o/s Elevator Lobby)
- Varnish Wood Door (Foyer o/s Elevator Lobby)
- Gray Drywall Wall (Elevator Lobby)
- White Drywall Ceiling (Elevator Lobby)
- Black Wood Cove Base (Old Lobby & Old Lobby Office)
- White Plaster Wall (Old Lobby & Old Lobby Office)
- White Plaster Ceiling (Old Lobby & Old Lobby Office)
- Black Metal Exterior Door Frame (Old Lobby & Old Lobby Office)
- Green Metal Doors (Old Lobby)
- Blue Drywall Wall (Old Lobby Office)
- Blue Plaster Wall (Old Lobby Office)
- Black Metal Recessed Heaters (Old Lobby Office)
- Black Metal Door Frame (Old Lobby Office)
- Black Wood Door (Old Lobby Office)
- Beige Plaster Wall (Spiral Staircase)
- Yellow Plaster Wall (Auditorium 2nd Level Sound Booth)
- Yellow Wood Wall (Auditorium 2nd Level Sound Booth)
- White Concrete Ceiling (Auditorium 2nd Level Sound Booth)
- White Plaster Ceiling (Auditorium)
- Brown Wood Door Frame (Auditorium 2nd Level Sound Booth)
- Brown Wood Door (Auditorium 2nd Level Sound Booth)
- Black Metal Door Frame (Old Lobby Office)
- Black Metal Door (Old Lobby Office)

C. PCB-CONTAINING MATERIAL

Analytical results of the bulk samples collected indicate that the following materials **contain PCB** (greater than 50 PPM).

- **Pending Results**

Analytical results of the bulk samples collected indicate that the following materials **did not contain PCB** (less than 50 PPM);

- Coping Stone Caulking, Gray
- Cap Flash Caulking, Gray



Report for Environmental Inspection Services

4.0 INSPECTION RESULTS

A. ASBESTOS-CONTAINING MATERIAL

The asbestos inspection involved a thorough visual examination of all areas that may be impacted as part of the school district's proposed Interior & Exterior Upgrade Project. The following suspect materials were sampled and analyzed for asbestos content by WSP:

4.1 Table 4.1 – Suspect Materials Inspected

HOMOGENOUS MATERIAL	LOCATION	MATERIAL	ASBESTOS CONTENT
Samples Collected on 11/4/19, 12/27 by WSP			
01	Basement Boiler Room	Cementitious Boiler Insulation, Gray	NAD
02	Basement Boiler Room	Fire Brick/Mortar, Red	NAD
03	Basement Boiler Room	Soft Insulation, White	NAD
04	Basement Boiler Room	Canvas associated with Fiberglass Pipe Insulation, White	NAD
05	Basement Boiler Room	Gasket to Boiler Hatch, White	NAD
06	Basement Boiler Room	Sealant to Duct Work & Boiler Hatch, Red	NAD
07	Basement Boiler Room	Sealant to Fume Hatch, Gray	2.40% Chrysotile 4.10% Chrysotile
08	Basement Boiler Room	Sealant to Fiberglass Pipe Insulation, White	NAD
09	Basement Boiler Room	Paint on Pump to Boilers 1 & 2, Green	NAD
10	Basement Boiler Room Exterior	Exterior Roll up Caulking, Gray	NAD
Samples Collected on 12/27 & 30, 2019 & 01/8/20 by WSP			
01	Room 255	Sink Undercoating, Pink	8.50% Chrysotile
02	Room 358	Sink Undercoating, White	NAD
03	Room 143	Mastic associated with 4" Beige Cove Base, Cream	NAD
04	Room 203	Mastic associated with 4" Brown Cove Base, Brown	NAD
05	Room 201	Mastic associated with 4" Gray Cove Base, Tan	NAD
06	Hallway Outside of Room 210	Terrazzo Flooring, Multi Colored	NAD
07	Room 166 & 143	Mastic associated with 12"x12" Beige Floor Tile, Yellow	NAD
08	Room 166 & 143	12"x12" Beige Floor Tiles	NAD
09	Room 166	Mastic associated with 12"x12" Salmon Floor Tile, Yellow	NAD
10	Room 166	12"x12" Salmon Floor Tiles	NAD



Report for Environmental Inspection Services

HOMOGENOUS MATERIAL	LOCATION	MATERIAL	ASBESTOS CONTENT
11	Room 255 & 358	Mastic associated with 12"x12" Beige Floor Tile, Black	NAD
12	Room 255 & 358	12"x12" Beige Floor Tiles	NAD
13	Room 358	Leveling Compound Under Wood, Gray/White (Bottom Layer)	NAD
14	Room 358	Mastic associated with 12"x12" Salmon Floor Tile, Brown (Top Layer)	NAD
15	Room 358	12"x12" Salmon Floor Tiles	NAD
16	Room 352	Mastic associated with Beige with Brown Spots Floor Tiles, Black (Bottom Layer)	--
17	Room 352	Beige with Brown Spots Floor Tiles	NAD
18	Room 352	Mastic associated with 12"x12" Beige with Brown Spots Floor Tiles, Yellow (2 nd Layer)	NAD
19	Room 352	12"x12" Beige with Brown Spots Floor Tiles	NAD
20	Room 308	Mastic associated with Beige Floor Tiles, Black (Bottom layer)	NAD
21	Room 308	Beige Floor Tiles (Bottom layer)	1.10% Chrysotile
22	Room 308	Mastic associated with Beige Floor Tiles, Yellow (2 nd Layer)	NAD
23	Room 308	Beige Floor Tiles (2 nd Layer)	1.90% Chrysotile
24	Room 308	Mastic associated with 12"x12" White Floor Tiles, Yellow (Top Layer)	NAD
25	Room 308	12"x12" White Floor Tiles (Top Layer)	NAD
26	Room 107	Leveling Compound, Gray (Bottom Layer)	10.00% Chrysotile
27	Room 301	Leveling Compound, Brown (Bottom Layer)	NAD
28	Room 301	Mastic associated with 9"x9" Floor Tiles, Black (2 nd Layer)	NAD
29	Room 101	Mastic associated with Gray Floor, Black (Bottom Layer)	NAD
30	Room 106	Gray Floor Tiles (Bottom Layer)	4.50% Chrysotile
31	Room 203	Mastic associated with 12"x12" Brown Floor Tiles, Black	<1% Chrysotile
32	Room 203	12"x12" Brown Floor Tiles	1.10% Chrysotile
33	Room 143	Mastic associated with 12"x12" Beige Spec Floor Tiles, Yellow	NAD



Report for Environmental Inspection Services

HOMOGENOUS MATERIAL	LOCATION	MATERIAL	ASBESTOS CONTENT
34	Room 143	12"x12" Beige Spec Floor Tiles	<1% Anthophyllite
35	Room 143	12"x12" Turquoise Floor Tiles	NAD
36	Room 203A	Mastic associated with Brown Vinyl Flooring, Orange	NAD
37	Room 203A	Brown Vinyl Flooring	1.10% Chrysotile
38	Room 207	12"x12" Green Floor Tiles	NAD
39	Room 140	Mastic associated with Black & Red Floor Tiles, Black (Bottom Layer)	1.20% Chrysotile
40	Room 140	12"x12" Red Floor Tiles	3.10% Chrysotile
41	Room 140	12"x12" Black Floor Tiles	2.30% Chrysotile
42	Roof G	Coping Stone Mortar, Gray	NAD
43	Roof G	Roof Seam Tar, Black	NAD
44	Roof G	Parapet Brick Mortar, Beige	NAD
45	Roof P	Chimney Brick Mortar, Beige	NAD
46	Roof I	Duct Insulation Tar Paper, Black	NAD
47	Roof I	Pitch Pocket Tar, Black	NAD
48	Roof G	Fascia & Coping Stone Caulking, Beige	NAD
49	Roof G	Perimeter Cap Flash Caulking, Gray	NAD
50	Roof C	Roofing Membrane & Tar, Black	NAD
51	Roof K	Felt Paper to Foam, Black (Bottom Layer)	NAD
52	Roof K	Perlite Insulation, Brown (2 nd Layer)	NAD
53	Roof K	Roofing Membrane, Black (Top Layer)	NAD
54	Roof G	Tar, Black (Bottom Layer)	NAD
55	Roof G	Scrim Fabric, Black	NAD
56	Roof G	Perimeter Cap Flashing Membrane Tar, Black	NAD
57	Roof A	Curb Flashing & Tar, Black	NAD
Samples Collected on 12/27/2019 by WSP			
01	Music Suite Throughout	Glue Dots Associated With 1"x1" Ceiling Tile, Brown	NAD
02	Music Suite Throughout	Mastic associated with 4" Brown Cove Base, Brown	NAD
03	Music Suite Throughout	Mastic associated with 4" Black Cove Base, Beige	NAD
04	Music Lab 109 (Music Lab 112)	Mastic associated with Brown Floor Tiles, Black (Bottom Layer)	1.10% Chrysotile



Report for Environmental Inspection Services

HOMOGENOUS MATERIAL	LOCATION	MATERIAL	ASBESTOS CONTENT
05	Music Lab 109 (Music Lab 112)	Brown Floor Tiles (2 nd Layer)	NA/PS
06	Music Lab 109 (Music Lab 112)	Carpet Mastic, Yellow (Top Layer)	Contaminated ACM
07	Music Room 111 (On Steps & Platform)	Mastic associated with 12"x12" Brown with Spots Floor Tiles, Brown	<1% Chrysotile
08	Music Room 111 (On Steps & Platform)	12"x12" Brown with Spots Floor Tiles	1.80% Chrysotile
09	Music Room 111	Mastic associated with Gray Floor Tiles, Black (Bottom Layer)	1.30% Chrysotile
10	Music Room 111	Gray Floor Tiles (Bottom Layer)	3.10% Chrysotile
11	Music Room 111	Mastic associated with Brown Floor Tiles (4 th Layer)	2.00% Chrysotile
12	Music Room 111	Brown Floor Tiles, Brown (3 rd Layer)	1.40% Chrysotile
13	Music Room & Chorus Room	Mastic associated with 12"x12" Beige Floor Tile, Yellow (2 nd Layer)	Contaminated ACM
14	Music Room & Chorus Room	12"x12" Beige Floor Tile (Top Layer)	Contaminated ACM
15	Music Room Office 115	Mastic associated with Brown Floor Tiles, Black (Bottom Layer)	4.10% Chrysotile
16	Music Room Office 115	Brown Floor Tiles (2 nd Layer)	9.30% Chrysotile
17	Music Room Office 115	Leveling Compound, Gray	Contaminated ACM
Samples Collected on 11/06/2018 by WSP			
01	Middle School Auditorium Stage	Wall Plaster, Brown Coat	NAD
02	Middle School Auditorium Stage	Wall Plaster, White Coat	NAD
03	Middle School Auditorium Stage	Horsehair Pipe Insulation, Brown	NAD
04	Middle School Auditorium Stage	Canvas over Horsehair Pipe Insulation, White	NAD
05	Middle School Auditorium Stage (under stage)	Stage Curtain, Green	NAD
06	Middle School Auditorium Stage (under stage)	Stage Curtain, Black	NAD
07	Middle School Auditorium Stage (under stage)	Vapor Barrier, Black	NAD
08	Middle School Auditorium Stage (under stage)	Cementitious Slab, Gray	NAD



Report for Environmental Inspection Services

HOMOGENOUS MATERIAL	LOCATION	MATERIAL	ASBESTOS CONTENT
09	Middle School Auditorium Stage (under stage)	Paint on Wood, Black	NAD
10	Elevator Lobby, Old Lobby & Old Lobby Office	Joint Compound, White	NAD
11	Elevator Lobby, Old Lobby & Old Lobby Office	Drywall, Gray	NAD
12	Elevator Lobby	Glazed Block Mortar, Gray	NAD
13	Old Lobby & Old Lobby Office	Wall Plaster, Brown Coat	NAD
14	Old Lobby & Old Lobby Office	Wall Plaster, White Coat	NAD
15	Old Lobby & Old Lobby Office	Mastic associated with 4" Black Cove Base, White	NAD
16	Old Lobby & Old Lobby Office	Ceiling Plaster, Brown Coat	NAD
17	Old Lobby & Old Lobby Office	Ceiling Plaster, White Coat	NAD
18	Auditorium	Wall Plaster, Brown Coat	NAD
19	Auditorium	Wall Plaster, White Coat	NAD
20	Auditorium	Carpet Mastic, Yellow	NAD
21	Auditorium	Cement under Wood Floor, Gray	NAD
22	Auditorium (Lower Portion of Wall)	Cloth behind Compressed Board, Gray	NAD
23	Auditorium (Lower Portion of Wall)	Compressed Board, Brown	NAD
24	Auditorium	Corrugated Heater Insulation, Gray	33.30% Chrysotile
25	Auditorium	Ceiling Plaster, Brown Coat	NAD
26	Auditorium	Ceiling Plaster, White Coat	NAD
27	Auditorium Attic	Spray-on Fireproofing, Gray	NAD
28	Auditorium Attic	Pyrobar Ceiling, White	NAD
29	Auditorium Attic	Cinderblock Mortar, Gray	NAD
30	Auditorium Attic	Cementitious Material, White	NAD
31	Auditorium 2 nd Level Fan Rooms	Vibration Cloth, Brown	NAD
32	Auditorium Level & 2 nd Level (Behind Plaster Wall)	Vapor Barrier on Exterior Wall, Black	10.5% Chrysotile
33	Auditorium 2 nd Level Sound Booth	Mastic associated with 6" Black Cove Base, Cream	NAD
34	Auditorium 2 nd Level Sound Booth	Carpet Mastic, Green	NAD



Report for Environmental Inspection Services

HOMOGENOUS MATERIAL	LOCATION	MATERIAL	ASBESTOS CONTENT
35	Auditorium 2 nd Level Hall o/s Sound Booth	Ceiling Plaster, Brown Coat (Only Coat)	NAD
36	Auditorium 2 nd Level & Spiral Staircase	Wall Plaster, Brown Coat	NAD
37	Auditorium 2 nd Level & Spiral Staircase	Wall Plaster, White Coat	NAD
Samples Collected on 10/31/2018 by WSP			
01	Middle School Auditorium	Wall Plaster, Brown Coat	NAD
02	Middle School Auditorium	Wall Plaster, White Coat	NAD

Bold = Positive for ACM NAD = No Asbestos Detected

4.2 CONDITION AND FRIABILITY ASSESSMENT TABLE

For each inspection conducted, the inspector classifies ACM materials by friability and condition. This helps to determine the extent of damage in certain areas as well as the potential for further damage and Asbestos release due to disturbance of the material.

Table 4.2 – Condition and Friability Assessment

LOCATION	MATERIAL	QUANTITY	FRIABILITY	CONDITION
Basement Boiler Room	Sealant to Fume Hatch, Gray	4 LF	Non-friable	Good
1st Floor Room 255	Sink Undercoating, Pink	4 SF	Non-friable	Good
1st Floor Room 107	Leveling Compound, Gray (Bottom Layer)	600 SF	Friable	Good
	12"x12" White Floor Tiles (Top Layer) Contaminated ACM		Non-friable	
1st Floor Room 106	Gray Floor Tiles (Bottom Layer)	620 SF	Non-friable	Good
	12"x12" White Floor Tiles (Top Layer) Contaminated ACM			
1st Floor Room 140	Mastic associated with Black & Red Floor Tiles, Black (Bottom Layer)	800 SF	Non-friable	Good
	12"x12" Red Floor Tiles			
	12"x12" Black Floor Tiles			
1st Floor Weight Room	9"x9" Floor Tiles	1,500 SF	Non-friable	Good
2nd Floor Rooms 203 & Lab 201	12"x12" Brown Floor Tiles	1,440 SF	Non-friable	Good
2nd Floor Room 203A	Brown Vinyl Flooring	260 SF	Non-friable	Good



Report for Environmental Inspection Services

LOCATION	MATERIAL	QUANTITY	FRIABILITY	CONDITION
3 rd Floor Room 308	Beige Floor Tiles (Bottom layer)	800 SF	Non-friable	Good
	Beige Floor Tiles (2 nd Layer)			
	12"x12" White Floor Tiles (Top Layer) Contaminated ACM			

Condition Definitions:

Good: None/Minimal apparent damage to ACM

Fair: Up to 10% localized damage or up to 25% of the entire ACM is damaged

Poor: Over 10% localized damage or over 25% of the entire ACM is damaged

Note(s):

- Quantities are estimations and must be confirmed during contractor walkthrough.

4.3 SAMPLE ANALYSIS TABLE

Laboratory analysis results, in tabular form, are included in Appendix A.

B. LEAD-BASED PAINT

The lead inspection involved a thorough visual examination of all accessible areas impacted as part of the school district's proposed Interior & Exterior Upgrade Project. The following suspect surfaces were tested for lead content:

SAMPLE LOCATION	BUILDING COMPONENT	COLOR	SUBSTRATE	CONDITION	LEAD CONTENT (mg/cm2)
Samples Collected on 01/8/20 by WSP					
Calibration Check @ 1.0	---	---	---	---	1.0
Calibration Check @ 1.0	---	---	---	---	1.1
Calibration Check @ 1.0	---	---	---	---	1.2
Calibration Check @ 0.0	---	---	---	---	0.0
Calibration Check @ 0.0	---	---	---	---	0.0
Calibration Check @ 0.0	---	---	---	---	0.1
1 st Floor Room 143	Wall	Blue	Plaster	Good	0.1
3 rd Floor Room 353	Wall	Yellow	Plaster	Good	0.0
3 rd Floor Room 353	Wall	Yellow	Drywall	Good	0.1
Elevator Mech Room	Door & Frame	Brown	Metal	Good	0.2
2 nd Floor Room 201	Wall	Beige	Plaster	Good	0.1
Calibration Check @ 1.0	---	---	---	---	1.2



Report for Environmental Inspection Services

SAMPLE LOCATION	BUILDING COMPONENT	COLOR	SUBSTRATE	CONDITION	LEAD CONTENT (mg/cm2)
Calibration Check @ 1.0	---	---	---	---	1.2
Calibration Check @ 1.0	---	---	---	---	1.2
Calibration Check @ 0.0	---	---	---	---	0.2
Calibration Check @ 0.0	---	---	---	---	0.2
Calibration Check @ 0.0	---	---	---	---	0.1

Bold = Positive for LEAD

C. PCB-CONTAINING MATERIAL

PCB sampling involved collection of additional quantities of caulking or glazing materials, considered suspect ACM, for PCB analysis. The following suspect materials were tested for PCB content:

HOMOGENOUS MATERIAL	MATERIAL	SAMPLE LOCATION	PCB CONTENT (PPM)
01	Coping Stone Caulking, Gray	Roof G	Pending Results
02	Cap Flash Caulking, Gray	Roof G	Pending Results

Bold = Positive for PCB ND = No PCB Detected

5.0 AREAS NOT ACCESSIBLE

During the inspection the following areas were not accessible:

Spaces within Walls/Floors/Ceilings: Selective destructive sampling was performed on concealed spaces in walls to access plenum, chases etc. It should be assumed that asbestos containing materials may exist in these spaces. Any suspect materials encountered during work should be sampled for analysis before work continues.

Spaces within Building Envelope: Selective destructive sampling was performed to the building envelope. It should be assumed that asbestos containing materials may exist in these spaces. Any suspect materials encountered during work should be sampled for analysis before work continues.



Report for Environmental Inspection Services

6.0 CONCLUSIONS AND RECOMMENDATIONS

ACM materials have been identified in this inspection that may be impacted as part of the school district's proposed Interior & Exterior Upgrade Project. These materials, reported in Section 3.0 of this report, may require complete removal prior to the start of the proposed Interior & Exterior Upgrade Project.

The ACM, LBP and PCB inspection was conducted at the request of Hastings-on-Hudson Union Free School District for the proposed Interior & Exterior Upgrade Project. Any change in the scope of work will require further investigation to accurately classify any additional ACM, LBP and PCB resulting from the modified or updated scope of work.

7.0 REPORT CERTIFICATIONS

This report, and the supporting data, findings, conclusions, opinions, and recommendations it contains represent the result of WSP's efforts for the environmental inspection work at the Farragut Middle School/Hastings High School.

Opinions and recommendations presented in this report apply to site conditions and features as they existed at the time of WSP's site visits, and those reasonably foreseeable. They cannot necessarily apply to conditions and features of which WSP is unaware and has not had the opportunity to evaluate.

The conclusions presented in this report are professional opinions solely upon WSP's visual observations of accessible areas, laboratory test data, and current regulatory requirements. These conclusions are intended exclusively for the purpose stated herein and the site indicated for the project indicated.

Prepared by:

Marvin Luccioni
NYS DOL Inspector

Reviewed by:

Craig Napolitano, CHMM
Vice President, Emergency
Management & IH Services



**APPENDIX A:
ASBESTOS SAMPLE ANALYSIS RESULTS IN TABULAR FORM**

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
Samples Collected on 11/04/19 by WSP					
01	01	Basement Boiler Room	Cementitious Boiler Insulation, Gray	NAD	--
01	02	Basement Boiler Room	Cementitious Boiler Insulation, Gray	NAD	--
01	03	Basement Boiler Room	Cementitious Boiler Insulation, Gray	NAD	--
02	04	Basement Boiler Room	Fire Brick/Mortar, Red	NAD	--
02	05	Basement Boiler Room	Fire Brick/Mortar, Red	NAD	--
02	06	Basement Boiler Room	Fire Brick/Mortar, Red	NAD	--
03	07	Basement Boiler Room	Soft Insulation, White	NAD	--
03	08	Basement Boiler Room	Soft Insulation, White	NAD	--
03	09	Basement Boiler Room	Soft Insulation, White	NAD	--
04	10	Basement Boiler Room	Canvas associated with Fiberglass Pipe Insulation, White	NAD	--
04	11	Basement Boiler Room	Canvas associated with Fiberglass Pipe Insulation, White	NAD	--
04	12	Basement Boiler Room	Canvas associated with Fiberglass Pipe Insulation, White	NAD	--
05	13	Basement Boiler Room	Gasket to Boiler Hatch, White	NAD	NAD
05	14	Basement Boiler Room	Gasket to Boiler Hatch, White	NAD	NAD
06	15	Basement Boiler Room	Sealant to Duct Work & Boiler Hatch, Red	NAD	NAD
06	16	Basement Boiler Room	Sealant to Duct Work & Boiler Hatch, Red	NAD	NAD
07	17	Basement Boiler Room	Sealant to Fume Hatch, Gray	2.40% Chrysotile 4.10% Chrysotile	NA/PS
07	18	Basement Boiler Room	Sealant to Fume Hatch, Gray	NA/PS	NA/PS
08	19	Basement Boiler Room	Sealant to Fiberglass Pipe Insulation, White	NAD	NAD
08	20	Basement Boiler Room	Sealant to Fiberglass Pipe Insulation, White	NAD	NAD
09	21	Basement Boiler Room	Paint on Pump to Boilers 1 & 2, Green	NAD	NAD
09	22	Basement Boiler Room	Paint on Pump to Boilers 1 & 2, Green	NAD	NAD

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
10	23	Basement Boiler Room Exterior	Exterior Roll up Caulking, Gray	NAD	NAD
10	24	Basement Boiler Room Exterior	Exterior Roll up Caulking, Gray	NAD	NAD
Samples Collected on 12/27 & 30/19 by WSP					
01	01	Room 255	Sink Undercoating, Pink	8.50% Chrysotile	NA/PS
01	02	Room 255	Sink Undercoating, Pink	NA/PS	NA/PS
02	03	Room 358	Sink Undercoating, White	NAD	NAD
02	04	Room 358	Sink Undercoating, White	NAD	NAD
03	05	Room 143	Mastic associated with 4" Beige Cove Base, Cream	NAD	NAD
03	06	Room 143	Mastic associated with 4" Beige Cove Base, Cream	NAD	NAD
04	07	Room 203	Mastic associated with 4" Brown Cove Base, Brown	NAD	NAD
04	08	Room 203	Mastic associated with 4" Brown Cove Base, Brown	NAD	NAD
05	09	Room 201	Mastic associated with 4" Gray Cove Base, Tan	NAD	NAD
05	10	Room 201	Mastic associated with 4" Gray Cove Base, Tan	NAD	NAD
06	11	Hallway Outside of Room 210	Terrazzo Flooring, Multi Colored	NAD	--
06	12	Hallway Outside of Room 210	Terrazzo Flooring, Multi Colored	NAD	--
07	13	Room 166	Mastic associated with 12"x12" Beige Floor Tile, Yellow	NAD	NAD
07	14	Room 143	Mastic associated with 12"x12" Beige Floor Tile, Yellow	NAD	NAD
08	15	Room 166	12"x12" Beige Floor Tiles	NAD	NAD
08	16	Room 143	12"x12" Beige Floor Tiles	NAD	NAD
09	17	Room 166	Mastic associated with 12"x12" Salmon Floor Tile, Yellow	NAD	NAD
09	18	Room 166	Mastic associated with 12"x12" Salmon Floor Tile, Yellow	NAD	NAD
10	19	Room 166	12"x12" Salmon Floor Tiles	NAD	NAD

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
10	20	Room 166	12"x12" Salmon Floor Tiles	NAD	NAD
11	21	Room 255	Mastic associated with 12"x12" Beige Floor Tile, Black	NAD	NAD
11	22	Room 358	Mastic associated with 12"x12" Beige Floor Tile, Black	NAD	NAD
12	23	Room 255	12"x12" Beige Floor Tiles	NAD	NAD
12	24	Room 358	12"x12" Beige Floor Tiles	NAD	NAD
13	25	Room 358	Leveling Compound Under Wood, Gray/White (Bottom Layer)	NAD	--
13	26	Room 358	Leveling Compound Under Wood, Gray/White (Bottom Layer)	NAD	--
14	27	Room 358	Mastic associated with 12"x12" Salmon Floor Tile, Brown (Top Layer)	NAD	NAD
14	28	Room 358	Mastic associated with 12"x12" Salmon Floor Tile, Brown (Top Layer)	NAD	NAD
15	29	Room 358	12"x12" Salmon Floor Tiles	NAD	NAD
15	30	Room 358	12"x12" Salmon Floor Tiles	NAD	NAD
16	31	Room 352	Mastic associated with Beige with Brown Spots Floor Tiles, Black (Bottom Layer)	--	--
16	32	Room 352	Mastic associated with Beige with Brown Spots Floor Tiles, Black (Bottom Layer)	--	--
17	33	Room 352	Beige with Brown Spots Floor Tiles	NAD	NAD
17	34	Room 352	Beige with Brown Spots Floor Tiles	NAD	NAD
18	35	Room 352	Mastic associated with 12"x12" Beige with Brown Spots Floor Tiles, Yellow (2 nd Layer)	NAD	NAD
18	36	Room 352	Mastic associated with 12"x12" Beige with Brown Spots Floor Tiles, Yellow (2 nd Layer)	--	--

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
19	37	Room 352	12"x12" Beige with Brown Spots Floor Tiles	NAD	NAD
19	38	Room 352	12"x12" Beige with Brown Spots Floor Tiles	NAD	NAD
20	39	Room 308	Mastic associated with Beige Floor Tiles, Black (Bottom layer)	NAD	NAD
20	40	Room 308	Mastic associated with Beige Floor Tiles, Black (Bottom layer)	NAD	NAD
21	41	Room 308	Beige Floor Tiles (Bottom layer)	1.10% Chrysotile	NA/PS
21	42	Room 308	Beige Floor Tiles (Bottom layer)	NA/PS	NA/PS
22	43	Room 308	Mastic associated with Beige Floor Tiles, Yellow (2 nd Layer)	NAD	NAD
22	44	Room 308	Mastic associated with Beige Floor Tiles, Yellow (2 nd Layer)	NAD	NAD
23	45	Room 308	Beige Floor Tiles (2nd Layer)	1.90% Chrysotile	NA/PS
23	46	Room 308	Beige Floor Tiles (2nd Layer)	NA/PS	NA/PS
24	47	Room 308	Mastic associated with 12"x12" White Floor Tiles, Yellow (Top Layer)	NAD	NAD
24	48	Room 308	Mastic associated with 12"x12" White Floor Tiles, Yellow (Top Layer)	NAD	NAD
25	49	Room 308	12"x12" White Floor Tiles (Top Layer)	NAD	NAD
25	50	Room 308	12"x12" White Floor Tiles (Top Layer)	NAD	NAD
26	51	Room 107	Leveling Compound, Gray (Bottom Layer)	10.00% Chrysotile	NA/PS
26	52	Room 107	Leveling Compound, Gray (Bottom Layer)	NA/PS	NA/PS
27	53	Room 301	Leveling Compound, Brown (Bottom Layer)	NAD	NAD
27	54	Room 301	Leveling Compound, Brown (Bottom Layer)	NAD	NAD

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
28	55	Room 301	Mastic associated with 9"x9" Floor Tiles, Black (2 nd Layer)	NAD	NAD
28	56	Room 301	Mastic associated with 9"x9" Floor Tiles, Black (2 nd Layer)	NAD	NAD
29	57	Room 101	Mastic associated with Gray Floor, Black (Bottom Layer)	NAD	NAD
29	58	Room 101	Mastic associated with Gray Floor, Black (Bottom Layer)	NAD	NAD
30	59	Room 106	Gray Floor Tiles (Bottom Layer)	4.50% Chrysotile	NA/PS
30	60	Room 106	Gray Floor Tiles (Bottom Layer)	NA/PS	NA/PS
31	61	Room 203	Mastic associated with 12"x12" Brown Floor Tiles, Black	NAD	<1% Chrysotile
31	62	Room 203	Mastic associated with 12"x12" Brown Floor Tiles, Black	NAD	NAD
32	63	Room 203	12"x12" Brown Floor Tiles	1.10% Chrysotile	NA/PS
32	64	Room 203	12"x12" Brown Floor Tiles	NA/PS	NA/PS
33	65	Room 143	Mastic associated with 12"x12" Beige Spec Floor Tiles, Yellow	NAD	NAD
33	66	Room 143	Mastic associated with 12"x12" Beige Spec Floor Tiles, Yellow	NAD	NAD
34	67	Room 143	12"x12" Beige Spec Floor Tiles	NAD	<1% Anthophyllite
34	68	Room 143	12"x12" Beige Spec Floor Tiles	NAD	NAD
35	69	Room 143	12"x12" Turquoise Floor Tiles	NAD	NAD
35	70	Room 143	12"x12" Turquoise Floor Tiles	NAD	NAD
36	71	Room 203A	Mastic associated with Brown Vinyl Flooring, Orange	NAD	NAD
36	72	Room 203A	Mastic associated with Brown Vinyl Flooring, Orange	NAD	NAD

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
37	73	Room 203A	Brown Vinyl Flooring	1.10% Chrysotile	NA/PS
37	74	Room 203A	Brown Vinyl Flooring	NA/PS	NA/PS
38	75	Room 207	12"x12" Green Floor Tiles	NAD	NAD
38	76	Room 207	12"x12" Green Floor Tiles	NAD	NAD
39	77	Room 140	Mastic associated with Black & Red Floor Tiles, Black (Bottom Layer)	1.20% Chrysotile	NA/PS
39	78	Room 140	Mastic associated with Black & Red Floor Tiles, Black (Bottom Layer)	NA/PS	NA/PS
40	79	Room 140	12"x12" Red Floor Tiles	3.10% Chrysotile	NA/PS
40	80	Room 140	12"x12" Red Floor Tiles	NA/PS	NA/PS
41	81	Room 140	12"x12" Black Floor Tiles	2.30% Chrysotile	NA/PS
41	82	Room 140	12"x12" Black Floor Tiles	NA/PS	NA/PS
42	83	Roof G	Coping Stone Mortar, Gray	NAD	--
42	84	Roof G	Coping Stone Mortar, Gray	NAD	--
43	85	Roof G	Roof Seam Tar, Black	NAD	NAD
43	86	Roof G	Roof Seam Tar, Black	NAD	NAD
44	87	Roof G	Parapet Brick Mortar, Beige	NAD	--
44	88	Roof I	Parapet Brick Mortar, Beige	NAD	--
45	89	Roof P	Chimney Brick Mortar, Beige	NAD	--
45	90	Roof P	Chimney Brick Mortar, Beige	NAD	--
46	91	Roof I	Duct Insulation Tar Paper, Black	NAD	NAD
46	92	Roof I	Duct Insulation Tar Paper, Black	NAD	NAD
47	93	Roof I	Pitch Pocket Tar, Black	NAD	NAD
47	94	Roof I	Pitch Pocket Tar, Black	NAD	NAD
48	95	Roof G	Fascia & Coping Stone Caulking, Beige	NAD	NAD
48	96	Roof G	Fascia & Coping Stone Caulking, Beige	NAD	NAD
49	97	Roof G	Perimeter Cap Flash Caulking, Gray	NAD	NAD
49	98	Roof G	Perimeter Cap Flash Caulking, Gray	NAD	NAD
50	99	Roof C	Roofing Membrane & Tar, Black	NAD	NAD
50	100	Roof C	Roofing Membrane & Tar, Black	NAD	NAD

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
51	101	Roof K	Felt Paper to Foam, Black (Bottom Layer)	NAD	NAD
51	102	Roof L	Felt Paper to Foam, Black (Bottom Layer)	NAD	NAD
52	103	Roof K	Perlite Insulation, Brown (2 nd Layer)	NAD	--
52	104	Roof L	Perlite Insulation, Brown (2 nd Layer)	NAD	--
53	105	Roof K	Roofing Membrane, Black (Top Layer)	NAD	NAD
53	106	Roof L	Roofing Membrane, Black (Top Layer)	NAD	NAD
54	107	Roof G	Tar, Black (Bottom Layer)	NAD	NAD
54	108	Roof I	Tar, Black (Bottom Layer)	NAD	NAD
55	109	Roof G	Scrim Fabric, Black	NAD	NAD
55	110	Roof I	Scrim Fabric, Black	NAD	NAD
56	111	Roof G	Perimeter Cap Flashing Membrane Tar, Black	NAD	NAD
56	112	Roof B	Perimeter Cap Flashing Membrane Tar, Black	NAD	NAD
57	113	Roof A	Curb Flashing & Tar, Black	NAD	NAD
57	114	Roof A	Curb Flashing & Tar, Black	NAD	NAD
Samples Collected on 12/27/2019 by WSP					
01	01	Music Storage Room 116	Glue Dots Associated With 1"x1" Ceiling Tile, Brown	NAD	NAD
01	02	Music Storage Room 116	Glue Dots Associated With 1"x1" Ceiling Tile, Brown	NAD	NAD
02	03	Music Room 111	Mastic associated with 4" Brown Cove Base, Brown	NAD	NAD
02	04	Music Room 109	Mastic associated with 4" Brown Cove Base, Brown	NAD	NAD
03	05	Music Room 111	Mastic associated with 4" Black Cove Base, Beige	NAD	NAD
03	06	Music Room 109	Mastic associated with 4" Black Cove Base, Beige	NAD	NAD
04	07	Music Lab 109 (Music Lab 112)	Mastic associated with Brown Floor Tiles, Black (Bottom Layer)	1.10% Chrysotile	NA/PS

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
04	08	Music Lab 109 (Music Lab 112)	Mastic associated with Brown Floor Tiles, Black (Bottom Layer)	NA/PS	NA/PS
05	09	Music Lab 109 (Music Lab 112)	Brown Floor Tiles (2nd Layer)	NA/PS	NA/PS
05	10	Music Lab 109 (Music Lab 112)	Brown Floor Tiles (2nd Layer)	NA/PS	NA/PS
06	11	Music Lab 109 (Music Lab 112)	Carpet Mastic, Yellow (Top Layer)	NAD	<1% Chrysotile
06	12	Music Lab 109 (Music Lab 112)	Carpet Mastic, Yellow (Top Layer)	NAD	<1% Chrysotile
07	13	Music Room 111 (On Steps & Platform)	Mastic associated with 12"x12" Brown with Spots Floor Tiles, Brown	NAD	<1% Chrysotile
07	14	Music Room 111 (On Steps & Platform)	Mastic associated with 12"x12" Brown with Spots Floor Tiles, Brown	NAD	<1% Chrysotile
08	15	Music Room 111 (On Steps & Platform)	12"x12" Brown with Spots Floor Tiles	1.80% Chrysotile	NA/PS
08	16	Music Room 111 (On Steps & Platform)	12"x12" Brown with Spots Floor Tiles	NA/PS	NA/PS
09	17	Music Room 111	Mastic associated with Gray Floor Tiles, Black (Bottom Layer)	1.30% Chrysotile	NA/PS
09	18	Music Room 111	Mastic associated with Gray Floor Tiles, Black (Bottom Layer)	NA/PS	NA/PS
10	19	Music Room 111	Gray Floor Tiles (Bottom Layer)	3.10% Chrysotile	NA/PS
10	20	Music Room 111	Gray Floor Tiles (Bottom Layer)	NA/PS	NA/PS
11	21	Music Room 111	Mastic associated with Brown Floor Tiles (4th Layer)	<1% Chrysotile	2.00% Chrysotile
11	22	Music Room 111	Mastic associated with Brown Floor Tiles (4th Layer)	<1% Chrysotile	NA/PS
12	23	Music Room 111	Brown Floor Tiles, Brown (3rd Layer)	1.40% Chrysotile	NA/PS
12	24	Music Room 111	Brown Floor Tiles, Brown (3rd Layer)	NA/PS	NA/PS
13	25	Music Room 111	Mastic associated with 12"x12" Beige Floor Tile, Yellow (2 nd Layer)	NAD	NAD
13	26	Music Room 111	Mastic associated with 12"x12" Beige Floor Tile, Yellow (2 nd Layer)	NAD	NAD

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
14	27	Music Room 111	12"x12" Beige Floor Tile (Top Layer)	NAD	NAD
14	28	Music Room 111	12"x12" Beige Floor Tile (Top Layer)	NAD	NAD
15	29	Music Room Office 115	Mastic associated with Brown Floor Tiles , Black (Bottom Layer)	<1% Chrysotile	NAD
15	30	Music Room Office 115	Mastic associated with Brown Floor Tiles , Black (Bottom Layer)	4.10% Chrysotile	NAD
16	31	Music Room Office 115	Brown Floor Tiles (2nd Layer)	9.30% Chrysotile	NAD
16	32	Music Room Office 115	Brown Floor Tiles (2nd Layer)	NA/PS	NA/PS
17	33	Music Room Office 115	Leveling Compound, Gray	NAD	--
17	34	Music Room Office 115	Leveling Compound, Gray	NAD	--
Samples Collected on 11/06/2018 by WSP					
01	01	Middle School Auditorium Stage	Wall Plaster, Brown Coat	NAD	---
01	02	Middle School Auditorium Stage	Wall Plaster, Brown Coat	NAD	---
01	03	Middle School Auditorium Stage	Wall Plaster, Brown Coat	NAD	---
01	04	Middle School Auditorium Stage	Wall Plaster, Brown Coat	NAD	---
01	05	Middle School Auditorium Stage	Wall Plaster, Brown Coat	NAD	---
01	06	Middle School Auditorium Stage	Wall Plaster, Brown Coat	NAD	---
01	07	Middle School Auditorium Stage	Wall Plaster, Brown Coat	NAD	---
01	08	Middle School Auditorium Stage	Wall Plaster, Brown Coat	NAD	---
01	09	Middle School Auditorium Stage	Wall Plaster, Brown Coat	NAD	---
02	10	Middle School Auditorium Stage	Wall Plaster, White Coat	NAD	---
02	11	Middle School Auditorium Stage	Wall Plaster, White Coat	NAD	---
02	12	Middle School Auditorium Stage	Wall Plaster, White Coat	NAD	---
02	13	Middle School Auditorium Stage	Wall Plaster, White Coat	NAD	---
02	14	Middle School Auditorium Stage	Wall Plaster, White Coat	NAD	---
02	15	Middle School Auditorium Stage	Wall Plaster, White Coat	NAD	---
02	16	Middle School Auditorium Stage	Wall Plaster, White Coat	NAD	---
02	17	Middle School Auditorium Stage	Wall Plaster, White Coat	NAD	---
02	18	Middle School Auditorium Stage	Wall Plaster, White Coat	NAD	---
03	19	Middle School Auditorium Stage	Horsehair Pipe Insulation, Brown	NAD	---
03	20	Middle School Auditorium Stage	Horsehair Pipe Insulation, Brown	NAD	---
03	21	Middle School Auditorium Stage	Horsehair Pipe Insulation, Brown	NAD	---

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
04	22	Middle School Auditorium Stage	Canvas over Horsehair Pipe Insulation, White	NAD	---
04	23	Middle School Auditorium Stage	Canvas over Horsehair Pipe Insulation, White	NAD	---
04	24	Middle School Auditorium Stage	Canvas over Horsehair Pipe Insulation, White	NAD	---
05	25	Middle School Auditorium Stage (under stage)	Stage Curtain, Green	NAD	---
05	26	Middle School Auditorium Stage (under stage)	Stage Curtain, Green	NAD	---
06	27	Middle School Auditorium Stage (under stage)	Stage Curtain, Black	NAD	---
06	28	Middle School Auditorium Stage (under stage)	Stage Curtain, Black	NAD	---
07	29	Middle School Auditorium Stage (under stage)	Vapor Barrier, Black	NAD	NAD
07	30	Middle School Auditorium Stage (under stage)	Vapor Barrier, Black	NAD	NAD
08	31	Middle School Auditorium Stage (under stage)	Cementitious Slab, Gray	NAD	---
08	32	Middle School Auditorium Stage (under stage)	Cementitious Slab, Gray	NAD	---
09	33	Middle School Auditorium Stage (under stage)	Paint on Wood, Black	NAD	NAD
09	34	Middle School Auditorium Stage (under stage)	Paint on Wood, Black	NAD	NAD
10	35	Elevator Lobby	Joint Compound, White	NAD	---
10	36	Elevator Lobby	Joint Compound, White	NAD	---
10	37	Old Lobby	Joint Compound, White	NAD	---
11	38	Elevator Lobby	Drywall, Gray	NAD	---
11	39	Elevator Lobby	Drywall, Gray	NAD	---
11	40	Old Lobby	Drywall, Gray	NAD	---
12	41	Elevator Lobby	Glazed Block Mortar, Gray	NAD	---
12	42	Elevator Lobby	Glazed Block Mortar, Gray	NAD	---
13	43	Old Lobby	Wall Plaster, Brown Coat	NAD	---
13	44	Old Lobby	Wall Plaster, Brown Coat	NAD	---
13	45	Old Lobby	Wall Plaster, Brown Coat	NAD	---
13	46	Old Lobby	Wall Plaster, Brown Coat	NAD	---
13	47	Old Lobby Office	Wall Plaster, Brown Coat	NAD	---
13	48	Old Lobby Office	Wall Plaster, Brown Coat	NAD	---
13	49	Old Lobby Office	Wall Plaster, Brown Coat	NAD	---
14	50	Old Lobby	Wall Plaster, White Coat	NAD	---
14	51	Old Lobby	Wall Plaster, White Coat	NAD	---

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
14	52	Old Lobby	Wall Plaster, White Coat	NAD	---
14	53	Old Lobby	Wall Plaster, White Coat	NAD	---
14	54	Old Lobby Office	Wall Plaster, White Coat	NAD	---
14	55	Old Lobby Office	Wall Plaster, White Coat	NAD	---
14	56	Old Lobby Office	Wall Plaster, White Coat	NAD	---
15	57	Old Lobby	Mastic associated with 4" Black Cove Base, White	NAD	NAD
15	58	Old Lobby	Mastic associated with 4" Black Cove Base, White	NAD	NAD
16	59	Old Lobby	Ceiling Plaster, Brown Coat	NAD	---
16	60	Old Lobby	Ceiling Plaster, Brown Coat	NAD	---
16	61	Old Lobby	Ceiling Plaster, Brown Coat	NAD	---
16	62	Old Lobby	Ceiling Plaster, Brown Coat	NAD	---
16	63	Old Lobby	Ceiling Plaster, Brown Coat	NAD	---
16	64	Old Lobby Office	Ceiling Plaster, Brown Coat	NAD	---
16	65	Old Lobby Office	Ceiling Plaster, Brown Coat	NAD	---
17	66	Old Lobby	Ceiling Plaster, White Coat	NAD	---
17	67	Old Lobby	Ceiling Plaster, White Coat	NAD	---
17	68	Old Lobby	Ceiling Plaster, White Coat	NAD	---
17	69	Old Lobby	Ceiling Plaster, White Coat	NAD	---
17	70	Old Lobby	Ceiling Plaster, White Coat	NAD	---
17	71	Old Lobby Office	Ceiling Plaster, White Coat	NAD	---
17	72	Old Lobby Office	Ceiling Plaster, White Coat	NAD	---
18	73	Auditorium	Wall Plaster, Brown Coat ¹	NAD	---
18	74	Auditorium	Wall Plaster, Brown Coat ¹	NAD	---
19	75	Auditorium	Wall Plaster, White Coat ²	NAD	---
19	76	Auditorium	Wall Plaster, White Coat ²	NAD	---
20	77	Auditorium	Carpet Mastic, Yellow	NAD	NAD
20	78	Auditorium	Carpet Mastic, Yellow	NAD	NAD
21	79	Auditorium	Cement under Wood Floor, Gray	NAD	---
21	80	Auditorium	Cement under wood Floor, Gray	NAD	---
22	81	Auditorium (Lower Portion of Wall)	Cloth behind Compressed Board, Gray	NAD	---
22	82	Auditorium (Lower Portion of Wall)	Cloth behind Compressed Board, Gray	NAD	---

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
23	83	Auditorium (Lower Portion of Wall)	Compressed Board, Brown	NAD	---
23	84	Auditorium (Lower Portion of Wall)	Compressed Board, Brown	NAD	---
24	85	Auditorium	Corrugated Heater Insulation, Gray	33.30% Chrysotile	NA/PS
24	86	Auditorium	Corrugated Heater Insulation, Gray	NA/PS	NA/PS
24	87	Auditorium	Corrugated Heater Insulation, Gray	NA/PS	NA/PS
25	88	Auditorium	Ceiling Plaster, Brown Coat	NAD	---
25	89	Auditorium	Ceiling Plaster, Brown Coat	NAD	---
25	90	Auditorium	Ceiling Plaster, Brown Coat	NAD	---
25	91	Auditorium	Ceiling Plaster, Brown Coat	NAD	---
25	92	Auditorium	Ceiling Plaster, Brown Coat	NAD	---
25	93	Auditorium	Ceiling Plaster, Brown Coat	NAD	---
25	94	Auditorium	Ceiling Plaster, Brown Coat	NAD	---
25	95	Auditorium	Ceiling Plaster, Brown Coat	NAD	---
25	96	Auditorium	Ceiling Plaster, Brown Coat	NAD	---
26	97	Auditorium	Ceiling Plaster, White Coat	NAD	---
26	98	Auditorium	Ceiling Plaster, White Coat	NAD	---
26	99	Auditorium	Ceiling Plaster, White Coat	NAD	---
26	100	Auditorium	Ceiling Plaster, White Coat	NAD	---
26	101	Auditorium	Ceiling Plaster, White Coat	NAD	---
26	102	Auditorium	Ceiling Plaster, White Coat	NAD	---
26	103	Auditorium	Ceiling Plaster, White Coat	NAD	---
26	104	Auditorium	Ceiling Plaster, White Coat	NAD	---
26	105	Auditorium	Ceiling Plaster, White Coat	NAD	---
27	106	Auditorium Attic	Spray-on Fireproofing, Gray	NAD	---
27	107	Auditorium Attic	Spray-on Fireproofing, Gray	NAD	---
27	108	Auditorium Attic	Spray-on Fireproofing, Gray	NAD	---
28	109	Auditorium Attic	Pyrobar Ceiling, White	NAD	---
28	110	Auditorium Attic	Pyrobar Ceiling, White	NAD	---
29	111	Auditorium Attic	Cinderblock Mortar, Gray	NAD	---
29	112	Auditorium Attic	Cinderblock Mortar, Gray	NAD	---
30	113	Auditorium Attic	Cementitious Material, White	NAD	---
30	114	Auditorium Attic	Cementitious Material, White	NAD	---

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
31	115	Auditorium 2 nd Level Fan Room	Vibration Cloth, Brown	NAD	---
31	116	Auditorium 2 nd Level Fan Room	Vibration Cloth, Brown	NAD	---
32	117	Auditorium 2nd Level (Behind Plaster Wall)	Vapor Barrier on Exterior Wall, Black	10.5% Chrysotile	NA/PS
32	118	Auditorium 2nd Level (Behind Plaster Wall)	Vapor Barrier on Exterior Wall, Black	NA/PS	NA/PS
33	119	Auditorium 2 nd Level Sound Booth	Mastic associated with 6" Black Cove Base, Cream	NAD	NAD
33	120	Auditorium 2 nd Level Sound Booth	Mastic associated with 6" Black Cove Base, Cream	NAD	NAD
34	121	Auditorium 2 nd Level Sound Booth	Carpet Mastic, Green	NAD	NAD
34	122	Auditorium 2 nd Level Sound Booth	Carpet Mastic, Green	NAD	NAD
35	123	Auditorium 2 nd Level Hall o/s Sound Booth	Ceiling Plaster, Brown Coat (Only Coat)	NAD	---
35	124	Auditorium 2 nd Level Hall o/s Sound Booth	Ceiling Plaster, Brown Coat (Only Coat)	NAD	---
35	125	Auditorium 2 nd Level Hall o/s Sound Booth	Ceiling Plaster, Brown Coat (Only Coat)	NAD	---
35	126	Auditorium 2 nd Level Hall o/s Sound Booth	Ceiling Plaster, Brown Coat (Only Coat)	NAD	---
35	127	Auditorium 2 nd Level Hall o/s Sound Booth	Ceiling Plaster, Brown Coat (Only Coat)	NAD	---
36	128	Auditorium 2 nd Level & Spiral Staircase	Wall Plaster, Brown Coat	NAD	---
36	129	Auditorium 2 nd Level Spiral Staircase & Hall	Wall Plaster, Brown Coat	NAD	---
36	130	Auditorium 2 nd Level Spiral Staircase & Hall	Wall Plaster, Brown Coat	NAD	---
36	131	Auditorium 2 nd Level Spiral Staircase & Hall	Wall Plaster, Brown Coat	NAD	---
36	132	Auditorium 2 nd Level Spiral Staircase & Hall	Wall Plaster, Brown Coat	NAD	---
36	133	Auditorium 2 nd Level Spiral Staircase & Hall	Wall Plaster, Brown Coat	NAD	---
36	134	Auditorium 2 nd Level Spiral Staircase & Hall	Wall Plaster, Brown Coat	NAD	---
36	135	Auditorium 2 nd Level Spiral Staircase & Hall	Wall Plaster, Brown Coat	NAD	---
36	136	Auditorium 2 nd Level Spiral Staircase & Hall	Wall Plaster, Brown Coat	NAD	---
37	137	Auditorium 2 nd Level & Spiral Staircase	Wall Plaster, White Coat	NAD	---
37	138	Auditorium 2 nd Level & Spiral Staircase	Wall Plaster, White Coat	NAD	---
37	139	Auditorium 2 nd Level & Spiral Staircase	Wall Plaster, White Coat	NAD	---
37	140	Auditorium 2 nd Level & Spiral Staircase	Wall Plaster, White Coat	NAD	---
37	141	Auditorium 2 nd Level & Spiral Staircase	Wall Plaster, White Coat	NAD	---
37	142	Auditorium 2 nd Level & Spiral Staircase	Wall Plaster, White Coat	NAD	---
37	143	Auditorium 2 nd Level & Spiral Staircase	Wall Plaster, White Coat	NAD	---

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop

FARRAGUT MIDDLE SCHOOL & HASTINGS HIGH SCHOOL
27 FARRAGUT AVE. & 1 HOPE BLVD., HASTINGS-ON-HUDSON, NY 10706

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
37	144	Auditorium 2 nd Level & Spiral Staircase	Wall Plaster, White Coat	NAD	---
37	145	Auditorium 2 nd Level & Spiral Staircase	Wall Plaster, White Coat	NAD	---
Samples Collected on 10/31/2018 by WSP					
01	01	Middle School Auditorium	Wall Plaster, Brown Coat	NAD	---
01	02	Middle School Auditorium	Wall Plaster, Brown Coat	NAD	---
01	03	Middle School Auditorium	Wall Plaster, Brown Coat	NAD	---
01	04	Middle School Auditorium	Wall Plaster, Brown Coat	NAD	---
01	05	Middle School Auditorium	Wall Plaster, Brown Coat	NAD	---
01	06	Middle School Auditorium	Wall Plaster, Brown Coat	NAD	---
01	07	Middle School Auditorium	Wall Plaster, Brown Coat	NAD	---
02	08	Middle School Auditorium	Wall Plaster, White Coat	NAD	---
02	09	Middle School Auditorium	Wall Plaster, White Coat	NAD	---
02	10	Middle School Auditorium	Wall Plaster, White Coat	NAD	---
02	11	Middle School Auditorium	Wall Plaster, White Coat	NAD	---
02	12	Middle School Auditorium	Wall Plaster, White Coat	NAD	---
02	13	Middle School Auditorium	Wall Plaster, White Coat	NAD	---
02	14	Middle School Auditorium	Wall Plaster, White Coat	NAD	---

Bold = Positive for ACM

NAD = No Asbestos Detected

NA/PS = Not Analyzed/Positive Stop



**APPENDIX B:
ASBESTOS BULK SAMPLE
CHAIN OF CUSTODY & LABORATORY RESULTS**



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
 Tel/Fax: (516) 997-7251 / (516) 997-7528
<http://www.EMSL.com / carleplacelab@emsl.com>

EMSL Order: 061925277
Customer ID: LBAP78
Customer PO: 2043479.28
Project ID:

Attention: Marvin Luccioni
 Louis Berger U.S., Inc
 96 Morton Street
 8th floor
 New York, NY 10014

Phone: (718) 730-2741

Fax:

Received Date: 11/09/2019 7:52 AM

Analysis Date: 11/12/2019

Collected Date: 11/04/2019

Project: 2043479.28, H.O.H SD, Hastings MS/HS @ 27 Farragut Ave., Hastings on Hudson, NY, Boiler Room

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 01-01 061925277-0001		Description	Basement - Boiler Room - Cementitious Boiler Insulation - Gray		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	11/12/2019	Gray/ Tan		35.00% Ca Carbonate 20.00% Gypsum 5.00% Non-fibrous (other) 40.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 01-02 061925277-0002		Description	Basement - Boiler Room - Cementitious Boiler Insulation - Gray		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	11/12/2019	Gray/ Tan		40.00% Ca Carbonate 10.00% Gypsum 8.00% Non-fibrous (other) 42.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 01-03 061925277-0003		Description	Basement - Boiler Room - Cementitious Boiler Insulation - Gray		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	11/12/2019	Gray/ Tan		37.00% Ca Carbonate 15.00% Gypsum 5.00% Non-fibrous (other) 43.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 02-04 061925277-0004		Description	Basement - Boiler Room - Fire Brick/Mortar - Red		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	11/12/2019	Red	2.00% Cellulose	40.00% Ca Carbonate 20.00% Gypsum 3.00% Non-fibrous (other) 35.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed

Initial report from: 11/12/2019 22:25:32



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 061925277

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 02-05 061925277-0005		Description	Basement - Boiler Room - Fire Brick/Mortar - Red		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	11/12/2019	Red		50.00% Ca Carbonate 12.00% Gypsum 2.00% Non-fibrous (other) 36.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 02-06 061925277-0006		Description	Basement - Boiler Room - Fire Brick/Mortar - Red		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	11/12/2019	Red		48.00% Ca Carbonate 10.00% Gypsum 4.00% Non-fibrous (other) 38.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 03-07 061925277-0007		Description	Basement - Boiler Room - Soft Insulation - White		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	11/12/2019	White	98.00% Min. Wool	2.00% Non-fibrous (other)	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 03-08 061925277-0008		Description	Basement - Boiler Room - Soft Insulation - White		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	11/12/2019	White	99.00% Min. Wool	1.00% Non-fibrous (other)	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 03-09 061925277-0009		Description	Basement - Boiler Room - Soft Insulation - White		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	11/12/2019	White	97.00% Min. Wool	3.00% Non-fibrous (other)	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 04-10 061925277-0010		Description	Basement - Boiler Room - Canvas assoc. w./ Fiberglass Pipe Insulation - White		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	11/12/2019	Tan/ White	85.00% Cellulose 10.00% Glass	5.00% Matrix	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed

Initial report from: 11/12/2019 22:25:32



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
 Tel/Fax: (516) 997-7251 / (516) 997-7528
<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 061925277
Customer ID: LBAP78
Customer PO: 2043479.28
Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos			Asbestos
			Fibrous	Non-Fibrous		
Sample ID 04-11 061925277-0011			Description Basement - Boiler Room - Canvas assoc. w./ Fiberglass Pipe Insulation - White Homogeneity Heterogeneous			
PLM NYS 198.1 Friable	11/12/2019	Tan/ White	80.00% Cellulose 10.00% Glass	5.00% Matrix 5.00% Non-fibrous (other)		None Detected
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB						Not Analyzed
TEM NYS 198.4 NOB						Not Analyzed
Sample ID 04-12 061925277-0012			Description Basement - Boiler Room - Canvas assoc. w./ Fiberglass Pipe Insulation - White Homogeneity Heterogeneous			
PLM NYS 198.1 Friable	11/12/2019	Tan/ White	84.00% Cellulose 8.00% Glass	5.00% Matrix 3.00% Non-fibrous (other)		None Detected
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB						Not Analyzed
TEM NYS 198.4 NOB						Not Analyzed
Sample ID 05-13 061925277-0013			Description Basement - Boiler Room - Gasket to Boiler Hatch - White Homogeneity Heterogeneous			
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	11/12/2019	White	24.00% Glass	76.00% Other		Inconclusive: None Detected
TEM NYS 198.4 NOB	11/12/2019	White		100.00% Other		None Detected
Sample ID 05-14 061925277-0014			Description Basement - Boiler Room - Gasket to Boiler Hatch - White Homogeneity Heterogeneous			
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	11/12/2019	White	24.00% Glass	76.00% Other		Inconclusive: None Detected
TEM NYS 198.4 NOB	11/12/2019	White		100.00% Other		None Detected
Sample ID 06-15 061925277-0015			Description Basement - Boiler Room - Sealant to Duct Work & Boiler Hatch - Red Homogeneity Heterogeneous			
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	11/12/2019	Red		100.00% Other		Inconclusive: None Detected
TEM NYS 198.4 NOB	11/12/2019	Red		100.00% Other		None Detected
Sample ID 06-16 061925277-0016			Description Basement - Boiler Room - Sealant to Duct Work & Boiler Hatch - Red Homogeneity Heterogeneous			
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	11/12/2019	Red		100.00% Other		Inconclusive: None Detected
TEM NYS 198.4 NOB	11/12/2019	Red		100.00% Other		None Detected

Initial report from: 11/12/2019 22:25:32



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
 Tel/Fax: (516) 997-7251 / (516) 997-7528
<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 061925277
Customer ID: LBAP78
Customer PO: 2043479.28
Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 07-17 061925277-0017		Description	Basement - Boiler Room - Sealant to Fume Hatch - Gray		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	11/12/2019	Gray	None	93.50% Other	2.40% Amosite 4.10% Chrysotile 6.5% Total
TEM NYS 198.4 NOB	11/12/2019				Not Analyzed
Sample ID 07-18 061925277-0018		Description	Basement - Boiler Room - Sealant to Fume Hatch - Gray		
		Homogeneity			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	11/12/2019				Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB	11/12/2019				Not Analyzed
Sample ID 08-19 061925277-0019		Description	Basement - Boiler Room - Sealant to Fiberglass Pipe Insulation - White		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	11/12/2019	White/ Yellow	5.50% Glass	94.50% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	11/12/2019	White/ Yellow		100.00% Other	None Detected
Sample ID 08-20 061925277-0020		Description	Basement - Boiler Room - Sealant to Fiberglass Pipe Insulation - White		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	11/12/2019	White/ Yellow	5.30% Glass	94.70% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	11/12/2019	White/ Yellow		100.00% Other	None Detected
Sample ID 09-21 061925277-0021		Description	Basement - Boiler Room - Paint on Pump to Boilers 1 & 2 - Green		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	11/12/2019	Brown/ Green		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	11/12/2019	Brown/ Green		100.00% Other	None Detected
Sample ID 09-22 061925277-0022		Description	Basement - Boiler Room - Paint on Pump to Boilers 1 & 2 - Green		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	11/12/2019	Brown/ Green		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	11/12/2019	Brown/ Green		100.00% Other	None Detected

Initial report from: 11/12/2019 22:25:32



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 061925277

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 10-23 061925277-0023		Description Homogeneity	Basement - Boiler Room - Exterior Roll-Up Gate Caulking - Gray Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	11/12/2019	Gray/ Red/ Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	11/12/2019	Gray/ Red/ Black		100.00% Other	None Detected
Sample ID 10-24 061925277-0024		Description Homogeneity	Basement - Boiler Room - Exterior Roll-Up Gate Caulking - Gray Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	11/12/2019	Red/ Clear		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	11/12/2019	Red/ Clear		100.00% Other	None Detected

Initial report from: 11/12/2019 22:25:32



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 061925277

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report: Asbestos Analysis of Bulk Material

The samples in this report were submitted to EMSL for analysis by Asbestos Analysis of Bulk Materials via NYS ELAP Approved Methods. The reference number for these samples is the EMSL Order ID above. Please use this reference number when calling about these samples.

Report Comments:

Sample Receipt Date: 11/9/2019

Sample Receipt Time: 7:52 AM

Analysis Completed Date: 11/12/2019

Analysis Completed Time: 7:54 AM

Analyst(s):

Omatie Ramrattan-Scarallo PLM NYS 198.1 Friable (12)

Erick Rosa PLM NYS 198.6 NOB (11)

Keith McWilliams TEM NYS 198.4 NOB (10)

Samples reviewed and approved by:

Daniel Clarke, Asbestos Laboratory Manager
or Other Approved Signatory

NOB = Non Friable Organically Bound N/A = Not Applicable VCM = Vermiculite Containing Material

-In New York State, TEM is currently the only method that can be used to determine if NOB materials can be considered or treated as non-asbestos containing.


All samples examined for the presence of vermiculite when analyzed via NYS 198.1.

-NYS Guidelines for Vermiculite containing samples are available at http://www.wadsworth.org/labcert/elapcert/forms/VermiculiteInterimGuidance_Rev070913.pdf EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples were received in good condition unless otherwise noted.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. This report may contain data that is not covered by the NVLAP accreditation.

Samples analyzed by EMSL Analytical, Inc. Carle Place, NY NYS ELAP 11469

Initial report from: 11/12/2019 22:25:32

		LOUIS BERGER		ASBESTOS SURVEY DATA SHEET/ CHAIN OF CUSTODY				PAGE <u>1</u> OF <u>2</u>	
LB PROJ <u>2043479.28</u>				LOCATION(S) SURVEYED: <u>BOILER ROOM</u>					
CLIENT: <u>H.O.H. S.D.</u>				PROPOSED PROJECT: <u>BOILER UPGRADE</u>					
PROJECT SITE: <u>HASTINGS MS/HSC@27 FARRAGUT AVE.</u>				DATE(S) OF INSPECTION: <u>11/04/19</u>					
Project Manager: <u>HASTINGS ON HUDSON, NY</u>				Inspector(s) <u>M. LUCCIONI</u>					
LOUIS BERGER TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341 ADDRESS: 98 Morton Street, 8 Floor, New York, NY 10014				RESULTS TO: <u>MLUCCIONI@LOUISBERGER.COM</u>				TURNAROUND TIME: <input type="checkbox"/> 4 HR. <input type="checkbox"/> 24 HRS. <input type="checkbox"/> 48 HRS. <input checked="" type="checkbox"/> 72 HRS.	
HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES				
01	01	CEMENTITIOUS BOILER INSULATION, GRAY	BASEMENT BOILER ROOM		2nd ANALYTICAL, INC. CARLE PLACE, NY 19 NOV - 9 AM 7:52				
↓	02								
↓	03								
02	04	FIRE BRICK / MORTAR, RED							
↓	05								
↓	06								
03	07	SOFT INSULATION, WHITE							
↓	08								
↓	09								
04	10	CANVAS ASSOC. W/ FIBERGLASS PIPE INSULATION, WHITE							
↓	11								
↓	12								

CHAIN OF CUSTODY

Relinquished by: (print) <u>M. LUCCIONI</u>	(Sign) <u>[Signature]</u>	<u>11/08/19</u>	AMPM	Relinquished by: (print) <u>[Signature]</u>	(Sign) <u>[Signature]</u>	<u>11/12/19</u>	AMPM	Relinquished by: (print) <u>[Signature]</u>	(Sign) <u>[Signature]</u>	<u>11/12/19</u>	AMPM
Received by: (print) <u>K. Viana</u>	(Sign) <u>[Signature]</u>	<u>11/09/19</u>	752 AMPM	Received by: (print) <u>[Signature]</u>	(Sign) <u>[Signature]</u>	<u>11/12/19</u>	AMPM	Received by: (print) <u>[Signature]</u>	(Sign) <u>[Signature]</u>	<u>11/12/19</u>	AMPM

GENERAL NOTES: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

061925277



LOUIS BERGER

ASBESTOS SURVEY DATA SHEET/ CHAIN OF CUSTODY

PAGE 2 OF 2LB PROJ 2043479.28CLIENT: H.O.H. S.D.LOCATION(S) SURVEYED: BOILER ROOMPROPOSED PROJECT: BOILER UPGRADEPROJECT SITE: HASTINGS MS/HS@27 FARRAGUT AVE.
HASTINGS ON HUDSON, NYDATE(S) OF INSPECTION: 11/04/19Inspector(s) M. Luccioni

Project Manager: _____

LOUIS BERGER

TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341

ADDRESS: 98 Morton Street, 8 Floor, New York, NY 10014

RESULTS TO: _____

MLUCCIONI@LOUISBERGER.COM

TURNAROUND TIME:

☐ 4 HR. ☐ 24 HRS. ☐ 48 HRS. ☒ 72 HRS. (K)

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
05	13	GASKET TO BOILER HATCH, WHITE	BASMENT BOILER ROOM		
↓	14	↓	↓		
06	15	SEALANT TO DUCT WORK & BOILER HATCH, RED			
↓	16	↓	↓		
07	17	SEALANT TO FUME HATCH, GRAY			WALL PENETRATION
↓	18	↓	↓		↓
08	19	SEALANT TO FIBERGLASS PIPE INSULATION, WHITE			19 NOV - 9 AM 7:52
↓	20	↓	↓		
09	21	PAINT ON PUMP TO BOILERS 1 & 2, GREEN			
↓	22	↓	↓		
10	23	EXTERIOR ROLLUP GATE CAULKING, GRAY			
↓	24	↓	↓		

CHAIN OF CUSTODY

Relinquished by: (print) M. Luccioni	(Sign) <u>M. Luccioni</u>	11/08/19	AMPM	Relinquished by: (print) _____	(Sign) _____	11/11/19	AMPM	Relinquished by: (print) _____	(Sign) _____	11/11/19	AMPM
Received by: (print) Katherine Viaud	(Sign) <u>K. Viaud</u>	11/09/19	7:52 AM	Received by: (print) _____	(Sign) _____	11/11/19	AMPM	Received by: (print) _____	(Sign) _____	11/11/19	AMPM

GENERAL NOTES: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

061925277

11/11/19



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
 Tel/Fax: (516) 997-7251 / (516) 997-7528
<http://www.EMSL.com / carleplacelab@emsl.com>

EMSL Order: 062000652
Customer ID: LBAP78
Customer PO: 2043479.28
Project ID:

Attention: Marvin Luccioni
 WSP USA Solutions Inc
 96 Morton Street
 8th floor
 New York, NY 10014

Phone: (718) 730-2741

Fax:

Received Date: 01/10/2020 5:51 PM

Analysis Date: 01/12/2020 - 01/14/2020

Collected Date: 12/27/2019

Project: H.O.H.U.F.S.D, Hastings MS/HS @ 27 Farragut Ave., Hasting-on-Hudson, NY 10706, Project #2043479.28

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 01-01 062000652-0001		Description Homogeneity	Room 225 - Sink Undercoating, Pink Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Pink	None	91.50% Other	8.50% Chrysotile
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 01-02 062000652-0002		Description Homogeneity	Room 225 - Sink Undercoating, Pink Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020				Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 02-03 062000652-0003		Description Homogeneity	Room 358 - Sink Undercoating, White Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	White		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	White		100.00% Other	None Detected
Sample ID 02-04 062000652-0004		Description Homogeneity	Room 358 - Sink Undercoating, White Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	White		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	White		100.00% Other	None Detected
Sample ID 03-05 062000652-0005		Description Homogeneity	Room 143 - Mastic associated with 4" Beige Cove Base, Cream Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/14/2020	White		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	White		100.00% Other	None Detected

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
 Tel/Fax: (516) 997-7251 / (516) 997-7528
<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652
Customer ID: LBAP78
Customer PO: 2043479.28
Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 03-06 062000652-0006		Description Homogeneity	Room 143 - Mastic associated with 4" Beige Cove Base, Cream Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/14/2020	White		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	White		100.00% Other	None Detected
Sample ID 04-07 062000652-0007		Description Homogeneity	Room 203 - Mastic associated with 4" Brown Cove Base, Brown Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Brown		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown		100.00% Other	None Detected
Sample ID 04-08 062000652-0008		Description Homogeneity	Room 203 - Mastic associated with 4" Brown Cove Base, Brown Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Brown		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown		100.00% Other	None Detected
Sample ID 05-09 062000652-0009		Description Homogeneity	Room 201 - Mastic associated with 4" Gray Cove Base, Tan Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Tan/ White		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Tan/ White		100.00% Other	None Detected
Sample ID 05-10 062000652-0010		Description Homogeneity	Room 201 - Mastic associated with 4" Gray Cove Base, Tan Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Tan/ White		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Tan/ White		100.00% Other	None Detected
Sample ID 06-11 062000652-0011		Description Homogeneity	Hallway outside of Room 210 - Terrazzo Flooring, Multi-Colored Heterogeneous		
PLM NYS 198.1 Friable	01/14/2020	Gray/ Red		50.00% Ca Carbonate 15.00% Non-fibrous (other) 35.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 06-12 062000652-0012		Description Homogeneity	Hallway outside of Room 210 - Terrazzo Flooring, Multi-Colored Heterogeneous		
PLM NYS 198.1 Friable	01/14/2020	Gray/ Red		60.00% Ca Carbonate 5.00% Non-fibrous (other) 35.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 07-13 062000652-0013		Description Homogeneity	Room 166 - Mastic associated with 12"x12" Beige Floor Tile, Yellow Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Tan/ White		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Tan/ White		100.00% Other	None Detected
Sample ID 07-14 062000652-0014		Description Homogeneity	Room 143 - Mastic associated with 12"x12" Beige Floor Tile, Yellow Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Tan/ White/ Red		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Tan/ White/ Red		100.00% Other	None Detected
Sample ID 08-15 062000652-0015		Description Homogeneity	Room 166 - 12"x12" Beige Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Gray/ Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Gray/ Beige		100.00% Other	None Detected
Sample ID 08-16 062000652-0016		Description Homogeneity	Room 143 - 12"x12" Beige Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Gray/ Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Gray/ Beige		100.00% Other	None Detected
Sample ID 09-17 062000652-0017		Description Homogeneity	Room 166 - Mastic associated with 12"x12" Salmon Floor Tile, Yellow Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	White/ Yellow		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	White/ Yellow		100.00% Other	None Detected

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
 Tel/Fax: (516) 997-7251 / (516) 997-7528
<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652
 Customer ID: LBAP78
 Customer PO: 2043479.28
 Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 09-18 062000652-0018		Description Homogeneity	Room 166 - Mastic associated with 12"x12" Salmon Floor Tile, Yellow Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	White/ Yellow		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	White/ Yellow		100.00% Other	None Detected
Sample ID 10-19 062000652-0019		Description Homogeneity	Room 166 - 12"x12" Salmon Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Gray/ Pink		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Gray/ Pink		100.00% Other	None Detected
Sample ID 10-20 062000652-0020		Description Homogeneity	Room 166 - 12"x12" Salmon Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Gray/ Pink		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Gray/ Pink		100.00% Other	None Detected
Sample ID 11-21 062000652-0021		Description Homogeneity	Room 255 - Mastic associated with 12"x12" Beige Floor Tile, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 11-22 062000652-0022		Description Homogeneity	Room 358 - Mastic associated with 12"x12" Beige Floor Tile, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 12-23 062000652-0023		Description Homogeneity	Room 255 - 12"x12" Beige Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	White/ Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	White/ Beige		100.00% Other	None Detected

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 12-24 062000652-0024		Description Homogeneity	Room 358 - 12"x12" Beige Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	White/ Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	White/ Beige		100.00% Other	None Detected
Sample ID 13-25 062000652-0025		Description Homogeneity	Room 358 - Leveling Compound under Wood, Gray/White (Bottom Layer) Homogeneous		
PLM NYS 198.1 Friable	01/14/2020	Brown		60.00% Ca Carbonate 1.00% Non-fibrous (other) 5.00% Perlite 34.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 13-26 062000652-0026		Description Homogeneity	Room 358 - Leveling Compound under Wood, Gray/White (Bottom Layer) Homogeneous		
PLM NYS 198.1 Friable	01/14/2020	Brown		50.00% Ca Carbonate 15.00% Gypsum 10.00% Perlite 25.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 14-27 062000652-0027		Description Homogeneity	Room 358 - Mastic associated with 12"x12" Salmon Floor Tile, Brown (Top Layer) Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Brown		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown		100.00% Other	None Detected
Sample ID 14-28 062000652-0028		Description Homogeneity	Room 358 - Mastic associated with 12"x12" Salmon Floor Tile, Brown (Top Layer) Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Brown		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown		100.00% Other	None Detected
Sample ID 15-29 062000652-0029		Description Homogeneity	Room 358 - 12"x12" Salmon Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/14/2020	Brown/ Pink		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown/ Pink		100.00% Other	None Detected

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 15-30 062000652-0030		Description Homogeneity	Room 358 - 12"x12" Salmon Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Brown/ Pink		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown/ Pink		100.00% Other	None Detected
Sample ID 16-31 062000652-0031		Description Homogeneity	Room 352 - Mastic associated with Beige with Brown Spots Floor Tiles, Black (Bottom Layer)		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/14/2020				Insufficient Material
TEM NYS 198.4 NOB	01/13/2020				Insufficient Material
Sample ID 16-32 062000652-0032		Description Homogeneity	Room 352 - Mastic associated with Beige with Brown Spots Floor Tiles, Black (Bottom Layer)		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020				Insufficient Material
TEM NYS 198.4 NOB	01/13/2020				Insufficient Material
Sample ID 17-33 062000652-0033		Description Homogeneity	Room 352 - Beige with Brown Spots Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/14/2020	Brown/ Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown/ Beige		100.00% Other	None Detected
Sample ID 17-34 062000652-0034		Description Homogeneity	Room 352 - Beige with Brown Spots Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Brown/ Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown/ Beige		100.00% Other	None Detected
Sample ID 18-35 062000652-0035		Description Homogeneity	Room 352 - Mastic associated with 12"x12" Beige with Brown Spots Floor Tiles, Yellow (2nd Layer) Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Yellow		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Yellow		100.00% Other	None Detected

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
 Tel/Fax: (516) 997-7251 / (516) 997-7528
<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652
Customer ID: LBAP78
Customer PO: 2043479.28
Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 18-36 062000652-0036		Description Homogeneity	Room 352 - Mastic associated with 12"x12" Beige with Brown Spots Floor Tiles, Yellow (2nd Layer)		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020				Insufficient Material
TEM NYS 198.4 NOB	01/13/2020				Insufficient Material
Sample ID 19-37 062000652-0037		Description Homogeneity	Room 352 - 12"x12" Beige with Brown Spots Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/14/2020	Brown/ Gray/ Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown/ Gray/ Beige		100.00% Other	None Detected
Sample ID 19-38 062000652-0038		Description Homogeneity	Room 352 - 12"x12" Beige with Brown Spots Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/14/2020	Brown/ Gray/ Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown/ Gray/ Beige		100.00% Other	None Detected
Sample ID 20-39 062000652-0039		Description Homogeneity	Room 308 - Mastic associated with Beige Floor Tiles, Black (Bottom Layer) Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 20-40 062000652-0040		Description Homogeneity	Room 308 - Mastic associated with Beige Floor Tiles, Black (Bottom Layer) Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 21-41 062000652-0041		Description Homogeneity	Room 308 - Beige Floor Tiles (Bottom Layer) Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Gray	None	98.90% Other	1.10% Chrysotile
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
 Tel/Fax: (516) 997-7251 / (516) 997-7528
<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652
 Customer ID: LBAP78
 Customer PO: 2043479.28
 Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 21-42 062000652-0042		Description Homogeneity	Room 308 - Beige Floor Tiles (Bottom Layer)		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/14/2020				Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 22-43 062000652-0043		Description Homogeneity	Room 308 - Mastic associated with Beige Floor Tiles, Yellow (2nd Layer)		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Yellow		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Yellow		100.00% Other	None Detected
Sample ID 22-44 062000652-0044		Description Homogeneity	Room 308 - Mastic associated with Beige Floor Tiles, Yellow (2nd Layer)		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Yellow		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Yellow		100.00% Other	None Detected
Sample ID 23-45 062000652-0045		Description Homogeneity	Room 308 - Beige Floor Tiles (2nd Layer)		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Gray/ Beige	None	98.10% Other	1.90% Chrysotile
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 23-46 062000652-0046		Description Homogeneity	Room 308 - Beige Floor Tiles (2nd Layer)		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/14/2020				Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 24-47 062000652-0047		Description Homogeneity	Room 308 - Mastic associated with 12"x12" White Floor Tiles, Yellow (Top Layer)		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Yellow		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Yellow		100.00% Other	None Detected

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 24-48 062000652-0048		Description Homogeneity	Room 308 - Mastic associated with 12"x12" White Floor Tiles, Yellow (Top Layer) Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Yellow		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Yellow		100.00% Other	None Detected
Sample ID 25-49 062000652-0049		Description Homogeneity	Room 308 - 12"x12" White Floor Tiles (Top Layer) Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Gray		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Gray		100.00% Other	None Detected
Sample ID 25-50 062000652-0050		Description Homogeneity	Room 308 - 12"x12" White Floor Tiles (Top Layer) Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Gray		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Gray		100.00% Other	None Detected
Sample ID 26-51 062000652-0051		Description Homogeneity	Room 103 - Leveling Compound, Gray (Bottom Layer) Homogeneous		
PLM NYS 198.1 Friable	01/14/2020	Brown/ Gray	2.00% Cellulose	30.00% Ca Carbonate 25.00% Gypsum 3.00% Mica 30.00% Quartz	10.00% Chrysotile
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 26-52 062000652-0052		Description Homogeneity	Room 103 - Leveling Compound, Gray (Bottom Layer) Homogeneous		
PLM NYS 198.1 Friable	01/14/2020				Positive Stop (Not Analyzed)
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 27-53 062000652-0053		Description Homogeneity	Room 301 - Leveling Compound, Brown (Bottom Layer) Homogeneous		
PLM NYS 198.1 Friable	01/14/2020	Brown	3.00% Cellulose	37.00% Ca Carbonate 35.00% Gypsum 25.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
 Tel/Fax: (516) 997-7251 / (516) 997-7528
<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 27-54 062000652-0054		Description	Room 301 - Leveling Compound, Brown (Bottom Layer)		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/14/2020	Brown	3.00% Cellulose	25.00% Ca Carbonate 34.00% Gypsum 1.00% Non-fibrous (other) 37.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 28-55 062000652-0055		Description	Room 301 - Mastic associated with 9"x9" Floor Tiles, Black (2nd Layer)		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 28-56 062000652-0056		Description	Room 301 - Mastic associated with 9"x9" Floor Tiles, Black (2nd Layer)		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 29-57 062000652-0057		Description	Room 101 - Mastic associated with Gray Floor, Black (Bottom Layer)		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 29-58 062000652-0058		Description	Room 101 - Mastic associated with Gray Floor, Black (Bottom Layer)		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 30-59 062000652-0059		Description	Room 101 - Gray Floor Tiles (Bottom Layer)		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020	Gray	None	95.50% Other	4.50% Chrysotile
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 30-60 062000652-0060		Description Homogeneity	Room 101 - Gray Floor Tiles (Bottom Layer)		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/13/2020				Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 31-61 062000652-0061		Description Homogeneity	Room 203 - Mastic associated with 12"x12" Brown Floor Tiles, Black		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/14/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black	None	100.00% Other	<1% Chrysotile
Sample ID 31-62 062000652-0062		Description Homogeneity	Room 203 - Mastic associated with 12"x12" Brown Floor Tiles, Black		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 32-63 062000652-0063		Description Homogeneity	Room 203 - 12"x12" Brown Floor Tiles		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Brown	None	98.90% Other	1.10% Chrysotile
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 32-64 062000652-0064		Description Homogeneity	Room 203 - 12"x12" Brown Floor Tiles		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020				Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 33-65 062000652-0065		Description Homogeneity	Room 143 - Mastic associated with 12"x12" Beige Spec Floor Tiles, Yellow		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Brown/ Orange		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown/ Orange		100.00% Other	None Detected

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
 Tel/Fax: (516) 997-7251 / (516) 997-7528
<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652
 Customer ID: LBAP78
 Customer PO: 2043479.28
 Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 33-66 062000652-0066		Description Homogeneity	Room 143 - Mastic associated with 12"x12" Beige Spec Floor Tiles, Yellow Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Brown/ Orange		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown/ Orange	None	100.00% Other	<1% Anthophyllite
Sample ID 34-67 062000652-0067		Description Homogeneity	Room 143 - 12"x12" Beige Spec Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Gray/ Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Gray/ Beige		100.00% Other	None Detected
Sample ID 34-68 062000652-0068		Description Homogeneity	Room 143 - 12"x12" Beige Spec Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Gray/ Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Gray/ Beige		100.00% Other	None Detected
Sample ID 35-69 062000652-0069		Description Homogeneity	Room 143 - 12"x12" Turquoise Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Blue/ Green		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Blue/ Green		100.00% Other	None Detected
Sample ID 35-70 062000652-0070		Description Homogeneity	Room 143 - 12"x12" Turquoise Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Blue/ Green		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Blue/ Green		100.00% Other	None Detected
Sample ID 36-71 062000652-0071		Description Homogeneity	Room 203A - Mastic associated with Brown Vinyl Flooring, Orange Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Brown/ Yellow		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown/ Yellow		100.00% Other	None Detected

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 36-72 062000652-0072		Description Homogeneity	Room 203A - Mastic associated with Brown Vinyl Flooring, Orange Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Brown/ Yellow		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown/ Yellow		100.00% Other	None Detected
Sample ID 37-73 062000652-0073		Description Homogeneity	Room 203A - Brown Vinyl Flooring Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Brown/ Gray/ Tan	None	98.90% Other	1.10% Chrysotile
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 37-74 062000652-0074		Description Homogeneity	Room 203A - Brown Vinyl Flooring		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020				Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 38-75 062000652-0075		Description Homogeneity	Room 207 - 12"x12" Green Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Green		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Green		100.00% Other	None Detected
Sample ID 38-76 062000652-0076		Description Homogeneity	Room 207 - 12"x12" Green Floor Tiles Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Green		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Green		100.00% Other	None Detected
Sample ID 39-77 062000652-0077		Description Homogeneity	Room 129 - Mastic associated with Black & Red Floor Tiles, Black (Bottom Layer) Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Brown/ Black	None	98.80% Other	1.20% Chrysotile
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 39-78 062000652-0078		Description Homogeneity	Room 140 - Mastic associated with Black & Red Floor Tiles, Black (Bottom Layer)		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020				Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 40-79 062000652-0079		Description Homogeneity	Room 129 - 12"x12" Red Floor Tiles		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Red	None	96.90% Other	3.10% Chrysotile
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 40-80 062000652-0080		Description Homogeneity	Room 140 - 12"x12" Red Floor Tiles		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020				Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 41-81 062000652-0081		Description Homogeneity	Room 129 - 12"x12" Black Floor Tiles		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black	None	97.70% Other	2.30% Chrysotile
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 41-82 062000652-0082		Description Homogeneity	Room 140 - 12"x12" Black Floor Tiles		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020				Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB	01/13/2020				Not Analyzed
Sample ID 42-83 062000652-0083		Description Homogeneity	Roof G - Coping Stone Mortar, Gray		
PLM NYS 198.1 Friable	01/14/2020	Gray	3.00% Cellulose	30.00% Ca Carbonate 15.00% Gypsum 2.00% Mica 5.00% Non-fibrous (other) 45.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
 Tel/Fax: (516) 997-7251 / (516) 997-7528
<http://www.EMSL.com / carleplacelab@emsl.com>

EMSL Order: 062000652
Customer ID: LBAP78
Customer PO: 2043479.28
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 42-84 062000652-0084		Description Roof G - Coping Stone Mortar, Gray Homogeneity Homogeneous			
PLM NYS 198.1 Friable	01/14/2020	Gray	2.00% Cellulose	35.00% Ca Carbonate 10.00% Gypsum 3.00% Mica 2.00% Non-fibrous (other) 48.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 43-85 062000652-0085		Description Roof G - Roof Seam Tar, Black Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 43-86 062000652-0086		Description Roof G - Roof Seam Tar, Black Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 44-87 062000652-0087		Description Roof G - Parapet Brick Mortar, Beige Homogeneity Homogeneous			
PLM NYS 198.1 Friable	01/14/2020	Gray	3.00% Cellulose	25.00% Ca Carbonate 15.00% Gypsum 4.00% Mica 3.00% Non-fibrous (other) 50.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 44-88 062000652-0088		Description Roof I - Parapet Brick Mortar, Beige Homogeneity Homogeneous			
PLM NYS 198.1 Friable	01/14/2020	Gray	3.00% Cellulose	30.00% Ca Carbonate 12.00% Gypsum 3.00% Mica 52.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 45-89 062000652-0089		Description Homogeneity	Roof P - Chimney Brick Mortar, Beige Homogeneous		
PLM NYS 198.1 Friable	01/14/2020	Brown		25.00% Ca Carbonate 13.00% Gypsum 3.00% Mica 2.00% Non-fibrous (other) 57.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 45-90 062000652-0090		Description Homogeneity	Roof P - Chimney Brick Mortar, Beige Homogeneous		
PLM NYS 198.1 Friable	01/14/2020	Brown	3.00% Cellulose	24.00% Ca Carbonate 15.00% Gypsum 5.00% Mica 3.00% Non-fibrous (other) 50.00% Quartz	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 46-91 062000652-0091		Description Homogeneity	Roof I - Duct Insulation Tar Paper, Black Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Brown/ Beige	<1.00% Glass	100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown/ Beige		100.00% Other	None Detected
Sample ID 46-92 062000652-0092		Description Homogeneity	Roof I - Duct Insulation Tar Paper, Black Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Brown/ Beige	2.40% Glass	97.60% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Brown/ Beige		100.00% Other	None Detected
Sample ID 47-93 062000652-0093		Description Homogeneity	Roof I - Pitch Pocket Tar, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 47-94 062000652-0094		Description Homogeneity	Roof I - Pitch Pocket Tar, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 48-95 062000652-0095		Description Homogeneity	Roof G - Fascia & Coping Stone Caulking, Beige Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Beige		100.00% Other	None Detected
Sample ID 48-96 062000652-0096		Description Homogeneity	Roof G - Fascia & Coping Stone Caulking, Beige Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Beige		100.00% Other	None Detected
Sample ID 49-97 062000652-0097		Description Homogeneity	Roof G - Perimeter Cap Flashing Caulking, Gray Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Gray		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Gray		100.00% Other	None Detected
Sample ID 49-98 062000652-0098		Description Homogeneity	Roof G - Perimeter Cap Flashing Caulking, Gray Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Gray		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Gray		100.00% Other	None Detected
Sample ID 50-99 062000652-0099		Description Homogeneity	Roof C - Roofing Membrane & Tar, Black Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 50-100 062000652-0100		Description Homogeneity	Roof C - Roofing Membrane & Tar, Black Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black	4.10% Glass	95.90% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 51-101 062000652-0101		Description	Roof K - Felt Paper to Foam, Black (Bottom)		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black/ Yellow	2.50% Glass	97.50% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black/ Yellow		100.00% Other	None Detected
Sample ID 51-102 062000652-0102		Description	Roof L - Felt Paper to Foam, Black (Bottom)		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black/ Yellow	2.10% Glass	97.90% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black/ Yellow		100.00% Other	None Detected
Sample ID 52-103 062000652-0103		Description	Roof K - Perlite Insulation, Brown (2nd)		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/14/2020	Gray	75.00% Cellulose	5.00% Non-fibrous (other) 20.00% Perlite	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 52-104 062000652-0104		Description	Roof L - Perlite Insulation, Brown (2nd)		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/14/2020	Gray	65.00% Cellulose	10.00% Non-fibrous (other) 25.00% Perlite	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 53-105 062000652-0105		Description	Roof K - Roofing Membrane, Black (Top)		
		Homogeneity	Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black	6.50% Glass	93.50% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 53-106 062000652-0106		Description	Roof L - Roofing Membrane, Black (Top)		
		Homogeneity	Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black	6.50% Glass	93.50% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 54-107 062000652-0107		Description Roof G - Tar, Black (Bottom)	Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black	2.90% Glass	97.10% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 54-108 062000652-0108		Description Roof I - Tar, Black (Bottom)	Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black	1.90% Glass	98.10% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 55-109 062000652-0109		Description Roof G - Scrim Fabric, Black (Top)	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 55-110 062000652-0110		Description Roof I - Scrim Fabric, Black (Top)	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 56-111 062000652-0111		Description Roof G - Perimeter Cap Flashing Membrane Tar, Black	Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black	3.20% Glass	96.80% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 56-112 062000652-0112		Description Roof B - Perimeter Cap Flashing Membrane Tar, Black	Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black	4.20% Glass	95.80% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 57-113 062000652-0113		Description Roof A - Curb Flashing @ Tar, Black	Homogeneity Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black	5.90% Glass	94.10% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected
Sample ID 57-114 062000652-0114		Description Roof F - Curb Flashing @ Tar, Black	Homogeneity Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	01/12/2020	Black	6.80% Glass	93.20% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	01/14/2020	Black		100.00% Other	None Detected

Initial report from: 01/14/2020 14:50:49



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 062000652

Customer ID: LBAP78

Customer PO: 2043479.28

Project ID:

Test Report: Asbestos Analysis of Bulk Material

The samples in this report were submitted to EMSL for analysis by Asbestos Analysis of Bulk Materials via NYS ELAP Approved Methods. The reference number for these samples is the EMSL Order ID above. Please use this reference number when calling about these samples.

Report Comments:

Sample Receipt Date: 1/10/2020

Sample Receipt Time: 5:51 PM

Analysis Completed Date: 1/13/2020

Analysis Completed Time: 3:42 PM

Analyst(s):

Omatie Ramrattan-Scarallo

Omatie Ramrattan-Scarallo PLM NYS 198.1 Friable (15)

Steve Juscuk

Steve Juscuk PLM NYS 198.6 NOB (79)

Soaiful Islam

Soaiful Islam TEM NYS 198.4 NOB (37)

Omatie Ramrattan-Scarallo

Omatie Ramrattan-Scarallo PLM NYS 198.6 NOB (7)

Rosemary Ortega

Rosemary Ortega TEM NYS 198.4 NOB (40)

Samples reviewed and approved by:

Daniel Clarke

Daniel Clarke, Asbestos Laboratory Manager
or Other Approved Signatory

NOB = Non Friable Organically Bound N/A = Not Applicable VCM = Vermiculite Containing Material

-In New York State, TEM is currently the only method that can be used to determine if NOB materials can be considered or treated as non-asbestos containing.

All samples examined for the presence of vermiculite when analyzed via NYS 198.1.

-NYS Guidelines for Vermiculite containing samples are available at http://www.wadsworth.org/labcert/elapcert/forms/VermiculiteInterimGuidance_Rev070913.pdf EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples were received in good condition unless otherwise noted.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. This report may contain data that is not covered by the NVLAP accreditation.

Samples analyzed by EMSL Analytical, Inc. Carle Place, NY NYS ELAP 11469

Initial report from: 01/14/2020 14:50:49

	ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY	PAGE <u>1</u> OF <u> </u>
--	--	-----------------------------

PROJECT NO.: 2043479.28
CLIENT: H.O.H.U.F.S.D
PROJECT SITE: Hastings MS/HS @ 27 Farragut Ave, Hastings-on-Hudson, NY 10706
Project Manager: M. Luccioni

LOCATION(S) SURVEYED: Various Interior & Exterior
PROPOSED PROJECT: Interior & Exterior Renovations
DATE(S) OF INSPECTION: 12/27 & 30/19
Inspector(s): M. Luccioni & L. Nevarez

WSP
 TELEPHONE NO. : (914) 798-3710
 ADDRESS: 565 Taxter Road Suite 510, Elmsford, NY 10523

RESULTS TO: Mluccioni@wsp.com

TURNAROUND TIME: ☐ 3 HR. ☐ 6 HR ☐ 24 HR
☐ 48 HR. ☒ 72 HR. ☐ OTHER _____

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
01	01	Sink Undercoating, Pink	Room 255		
01	02	Sink Undercoating, Pink	Room 255		
02	03	Sink Undercoating, White	Room 358		
02	04	Sink Undercoating, White	Room 358		
03	05	Mastic associated with 4" Beige Cove Base, Cream	Room 143		
03	06	Mastic associated with 4" Beige Cove Base, Cream	Room 143		
04	07	Mastic associated with 4" Brown Cove Base, Brown	Room 203		
04	08	Mastic associated with 4" Brown Cove Base, Brown	Room 203		
05	09	Mastic associated with 4" Gray Cove Base, Tan	Room 201		
05	10	Mastic associated with 4" Gray Cove Base, Tan	Room 201		
06	11	Terrazzo Flooring, Multi Colored	Hallway Outside of Room 210		
06	12	Terrazzo Flooring, Multi Colored	Hallway Outside of Room 210		

20 JAN 10 PM 5:51
 CARLE PLACE, NY
 WSP

CHAIN OF CUSTODY

Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Luis Nevarez		01/10/2020									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
Unique McKay	um	1/10/20	5:51pm								

General Notes: All inconclusive NOBs to be analyzed by TEM Please stop at 1st positive in any homogeneous group. @

© Imma Raur... 1/14/20

1/14/20 7:51pm 1.14.2020

062000652

1/14/20



ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 2 OF 10

OrderID: 062000652

PROJECT NO.: 2043479.28

CLIENT: H.O.H.U.F.S.D

PROJECT SITE: Hastings MS/HS @ 27 Farragut Ave, Hastings-on-Hudson, NY 10706

Project Manager: M. Luccioni

LOCATION(S) SURVEYED: Various Interior & Exterior

PROPOSED PROJECT: Interior & Exterior Renovations

DATE(S) OF INSPECTION: 12/27 & 30/19

Inspector(s): M. Luccioni & L. Nevarez

WSP
TELEPHONE NO. : (914) 798-3710
ADDRESS: 565 Taxter Road Suite 510, Elmsford, NY 10523

RESULTS TO: Mluccioni@wsp.com

TURNAROUND TIME: ☐ 3 HR. ☐ 6 HR ☐ 24 HR
☐ 48 HR. ☒ 72 HR. ☐ OTHER _____

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
07	13	Mastic associated with 12"x12" Beige Floor Tile, Yellow	Room 166		
07	14	Mastic associated with 12"x12" Beige Floor Tile, Yellow	Room 143		
08	15	12"x12" Beige Floor Tiles	Room 166		
08	16	12"x12" Beige Floor Tiles	Room 143		
09	17	Mastic associated with 12"x12" Salmon Floor Tile, Yellow	Room 166		
09	18	Mastic associated with 12"x12" Salmon Floor Tile, Yellow	Room 166		
10	19	12"x12" Salmon Floor Tiles	Room 166		
10	20	12"x12" Salmon Floor Tiles	Room 166		
11	21	Mastic associated with 12"x12" Beige Floor Tile, Black	Room 255		
11	22	Mastic associated with 12"x12" Beige Floor Tile, Black	Room 358		
12	23	12"x12" Beige Floor Tiles	Room 255		
12	24	12"x12" Beige Floor Tiles	Room 358		

20 JAN 10 PM 5:52
HASTINGS-ON-HUDSON, NY

CHAIN OF CUSTODY

Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Luis Nevarez		01/10/2020									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
Unique Meray	um	1/10/20	5:51PM								

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

Enmatia Rouse 1/14/20

7/11/20 7:00 PM

1.14.2020

062000652

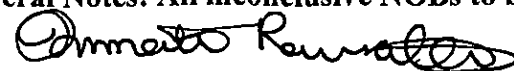
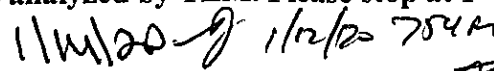
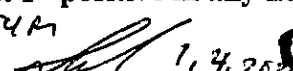
1/14/20

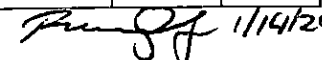
ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODYPAGE 3 OF **PROJECT NO.:** 2043479.28**CLIENT:** H.O.H.U.F.S.D**PROJECT SITE:** Hastings MS/HS @ 27 Farragut Ave, Hastings-on-Hudson, NY 10706**Project Manager:** M. Luccioni**LOCATION(S) SURVEYED:** Various Interior & Exterior**PROPOSED PROJECT:** Interior & Exterior Renovations**DATE(S) OF INSPECTION:** 12/27 & 30/19**Inspector(s):** M. Luccioni & L. NevarezWSP
TELEPHONE NO. : (914) 798-3710
ADDRESS: 565 Taxter Road Suite 510, Elmsford, NY 10523**RESULTS TO:** Mluccioni@wsp.comTURNAROUND TIME: ☐ 3 HR. ☐ 6 HR ☐ 24 HR☐ 48 HR. ☒ 72 HR. ☐ OTHER

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
13	25	Leveling Compound Under Wood, Gray/White (Bottom Layer)	Room 358		
13	26	Leveling Compound Under Wood, Gray/White (Bottom Layer)	Room 358		
14	27	Mastic associated with 12"x12" Salmon Floor Tile, Brown (Top Layer)	Room 358		
14	28	Mastic associated with 12"x12" Salmon Floor Tile, Brown (Top Layer)	Room 358		
15	29	12"x12" Salmon Floor Tiles	Room 358		
15	30	12"x12" Salmon Floor Tiles	Room 358		
16	31	Mastic associated with Beige with Brown Spots Floor Tiles, Black (Bottom Layer)	Room 352		
16	32	Mastic associated with Beige with Brown Spots Floor Tiles, Black (Bottom Layer)	Room 352		
17	33	Beige with Brown Spots Floor Tiles	Room 352		
17	34	Beige with Brown Spots Floor Tiles	Room 352		
18	35	Mastic associated with 12"x12" Beige with Brown Spots Floor Tiles, Yellow (2 nd Layer)	Room 352		2 layers (2 nd & Top)
18	36	Mastic associated with 12"x12" Beige with Brown Spots Floor Tiles, Yellow (2 nd Layer)	Room 352		2 layers (2 nd & Top)

CHAIN OF CUSTODY

Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Luis Nevarez		01/10/2020									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
Unique Mccoy	um	1/10/20	552PM								

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.






 20 JAN 10 PM 5:52
 CABLE PLANT, NY

ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODYPAGE 4 OF **PROJECT NO.:** 2043479.28**CLIENT:** H.O.H.U.F.S.D**PROJECT SITE:** Hastings MS/HS @ 27 Farraqu Ave, Hastings-on-Hudson, NY 10706**Project Manager:** M. Luccioni**LOCATION(S) SURVEYED:** Various Interior & Exterior**PROPOSED PROJECT:** Interior & Exterior Renovations**DATE(S) OF INSPECTION:** 12/27 & 30/19**Inspector(s):** M. Luccioni & L. NevarezWSP
TELEPHONE NO. : (914) 798-3710
ADDRESS: 565 Taxter Road Suite 510, Elmsford, NY 10523**RESULTS TO:** Mluccioni@wsp.comTURNAROUND TIME: ☐ 3 HR. ☐ 6 HR ☐ 24 HR☐ 48 HR. ☒ 72 HR. ☐ OTHER

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
19	37	12"x12" Beige with Brown Spots Floor Tiles	Room 352		2 layers (2 nd & Top)
19	38	12"x12" Beige with Brown Spots Floor Tiles	Room 352		2 layers (2 nd & Top)
20	39	Mastic associated with Beige Floor Tiles, Black (Bottom layer)	Room 308		20 JUN 10 PM 5:52 CARLE PLACE, NY 10510-1110
20	40	Mastic associated with Beige Floor Tiles, Black (Bottom layer)	Room 308		
21	41	Beige Floor Tiles (Bottom layer)	Room 308		
21	42	Beige Floor Tiles (Bottom layer)	Room 308		
22	43	Mastic associated with Beige Floor Tiles, Yellow (2 nd Layer)	Room 308		
22	44	Mastic associated with Beige Floor Tiles, Yellow (2 nd Layer)	Room 308		
23	45	Beige Floor Tiles (2 nd Layer)	Room 308		
23	46	Beige Floor Tiles (2 nd Layer)	Room 308		
24	47	Mastic associated with 12"x12" White Floor Tiles, Yellow (Top Layer)	Room 308		
24	48	Mastic associated with 12"x12" White Floor Tiles, Yellow (Top Layer)	Room 308		

CHAIN OF CUSTODY

Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Luis Nevarez		01/10/2020									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
Unique McElroy	um	1/10/20	5:52 PM								

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.*Omato Rencillas**1/12/20 7:04 R**1.14.2020**062000652*



ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 5 OF 10

PROJECT NO.: 2043479.28

CLIENT: H.O.H.U.F.S.D

PROJECT SITE: Hastings MS/HS @ 27 Farragut Ave. Hastings-on-Hudson, NY 10706

Project Manager: M. Luccioni

LOCATION(S) SURVEYED: Various Interior & Exterior

PROPOSED PROJECT: Interior & Exterior Renovations

DATE(S) OF INSPECTION: 12/27 & 30/19

Inspector(s): M. Luccioni & L. Nevarez

WSP
TELEPHONE NO. : (914) 798-3710
ADDRESS: 565 Taxter Road Suite 510, Elmsford, NY 10523

RESULTS TO: Mluccioni@wsp.com

TURNAROUND TIME: ☐ 3 HR. ☐ 6 HR ☐ 24 HR

☐ 48 HR. ☒ 72 HR. ☐ OTHER _____

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
25	49	12"x12" White Floor Tiles (Top Layer)	Room 308		
25	50	12"x12" White Floor Tiles (Top Layer)	Room 308		
26	51	Leveling Compound, Gray (Bottom Layer)	Room 103		Top Layer is Beige Floor Tiles with Yellow Mastic
26	52	Leveling Compound, Gray (Bottom Layer)	Room 103		Top Layer is Beige Floor Tiles with Yellow Mastic
27	53	Leveling Compound, Brown (Bottom Layer)	Room 301		
27	54	Leveling Compound, Brown (Bottom Layer)	Room 301		
28	55	Mastic associated with 9"x9" Floor Tiles, Black (2 nd Layer)	Room 301		9x9 Floor Tiles (Top Layer)
28	56	Mastic associated with 9"x9" Floor Tiles, Black (2 nd Layer)	Room 301		9x9 Floor Tiles (Top Layer)
29	57	Mastic associated with Gray Floor, Black (Bottom Layer)	Room 101		
29	58	Mastic associated with Gray Floor, Black (Bottom Layer)	Room 101		
30	59	Gray Floor Tiles (Bottom Layer)	Room 101		Top Layer is Beige Floor Tiles with Yellow Mastic
30	60	Gray Floor Tiles (Bottom Layer)	Room 101		Top Layer is Beige Floor Tiles with Yellow Mastic

CHAIN OF CUSTODY

Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Luis Nevarez		01/10/2020									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
Unique McKay	um	1/10/20	5:52 pm								

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

Omni-Kenall

1/12/20 7:54 PM

1.14.2020

062000652

OrderID: 062000652

ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 6 OF

PROJECT NO.: 2043479.28

CLIENT: H.O.H.U.F.S.D

PROJECT SITE: Hastings MS/HS @ 27 Farragut Ave, Hastings-on-Hudson, NY 10706

Project Manager: M. Luccioni

LOCATION(S) SURVEYED: Various Interior & Exterior

PROPOSED PROJECT: Interior & Exterior Renovations

DATE(S) OF INSPECTION: 12/27 & 30/19

Inspector(s): M. Luccioni & L. Nevarez

WSP
TELEPHONE NO. : (914) 798-3710
ADDRESS: 565 Taxter Road Suite 510, Elmsford, NY 10523

RESULTS TO: Mluccioni@wsp.com

TURNAROUND TIME: ☐ 3 HR. ☐ 6 HR ☐ 24 HR
☐ 48 HR. ☒ 72 HR. ☐ OTHER

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
31	61	Mastic associated with 12"x12" Brown Floor Tiles, Black	Room 203		
31	62	Mastic associated with 12"x12" Brown Floor Tiles, Black	Room 203		
32	63	12"x12" Brown Floor Tiles	Room 203		
32	64	12"x12" Brown Floor Tiles	Room 203		
33	65	Mastic associated with 12"x12" Beige Spec Floor Tiles, Yellow	Room 143		
33	66	Mastic associated with 12"x12" Beige Spec Floor Tiles, Yellow	Room 143		
34	67	12"x12" Beige Spec Floor Tiles	Room 143		
34	68	12"x12" Beige Spec Floor Tiles	Room 143		
35	69	12"x12" Turquoise Floor Tiles	Room 143		
35	70	12"x12" Turquoise Floor Tiles	Room 143		
36	71	Mastic associated with Brown Vinyl Flooring, Orange	Room 203A		
36	72	Mastic associated with Brown Vinyl Flooring, Orange	Room 203A		

CHAIN OF CUSTODY

Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Luis Nevarez		01/10/2020									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
Unique Mcroy	um	1/10/20	5:52 PM								

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

Amelia Ramirez 1/12/20 7:44 PM
1/14, 2020 062000652

OrderID: 062000652



ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 7 OF 10

PROJECT NO.: 2043479.28

CLIENT: H.O.H.U.F.S.D

PROJECT SITE: Hastings MS/HS @ 27 Farragut Ave, Hastings-on-Hudson, NY 10706

Project Manager: M. Luccioni

LOCATION(S) SURVEYED: Various Interior & Exterior

PROPOSED PROJECT: Interior & Exterior Renovations

DATE(S) OF INSPECTION: 12/27 & 30/19

Inspector(s): M. Luccioni & L. Nevarez

WSP
TELEPHONE NO. : (914) 798-3710
ADDRESS: 565 Taxter Road Suite 510, Elmsford, NY 10523

RESULTS TO: Mluccioni@wsp.com

TURNAROUND TIME: ☐ 3 HR. ☐ 6 HR ☐ 24 HR

☐ 48 HR. ☒ 72 HR. ☐ OTHER _____

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
37	73	Brown Vinyl Flooring	Room 203A		
37	74	Brown Vinyl Flooring	Room 203A		
38	75	12"x12" Green Floor Tiles	Room 207		Mastic is associated with 12"x12" White Floor Tiles, Yellow
38	76	12"x12" Green Floor Tiles	Room 207		Mastic is associated with 12"x12" White Floor Tiles, Yellow
39	77	Mastic associated with Black & Red Floor Tiles, Black (Bottom Layer)	Room 129		
39	78	Mastic associated with Black & Red Floor Tiles, Black (Bottom Layer)	Room 140		
40	79	12"x12" Red Floor Tiles	Room 129		
40	80	12"x12" Red Floor Tiles	Room 140		
41	81	12"x12" Black Floor Tiles	Room 129		
41	82	12"x12" Black Floor Tiles	Room 140		
42	83	Coping Stone Mortar, Gray	Roof G		
42	84	Coping Stone Mortar, Gray	Roof G		

CHAIN OF CUSTODY

Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Luis Nevarez		01/10/2020									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
Unique McKay	um	1/10/20	5:52 PM								

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

Orlando Rana...

1/12/20

7:42 PM


F...

1/14/20

062000652

20 JAN 10 PM 5:52
LABORATORY

OrderID: 062000652

 /Louis Berger		ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY				PAGE <u>8</u> OF <u> </u>	
PROJECT NO.: <u>2043479.28</u> CLIENT: <u>H.O.H.U.F.S.D</u> PROJECT SITE: <u>Hastings MS/HS @ 27 Farragut Ave, Hastings-on-Hudson, NY 10706</u> Project Manager: <u>M. Luccioni</u>				LOCATION(S) SURVEYED: <u>Various Interior & Exterior</u> PROPOSED PROJECT: <u>Interior & Exterior Renovations</u> DATE(S) OF INSPECTION: <u>12/27 & 30/19</u> Inspector(s): <u>M. Luccioni & L. Nevarez</u>			
WSP TELEPHONE NO. : (914) 798-3710 ADDRESS: 565 Taxter Road Suite 510, Elmsford, NY 10523				RESULTS TO: <u>Mluccioni@wsp.com</u>		TURNAROUND TIME: <input type="checkbox"/> 3 HR. <input type="checkbox"/> 6 HR <input type="checkbox"/> 24 HR <input type="checkbox"/> 48 HR. <input checked="" type="checkbox"/> 72 HR. <input type="checkbox"/> OTHER <u> </u>	
HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES		
43	85	Roof Seam Tar, Black	Roof G				
43	86	Roof Seam Tar, Black	Roof G				
44	87	Parapet Brick Mortar, Beige	Roof G				
44	88	Parapet Brick Mortar, Beige	Roof I				
45	89	Chimney Brick Mortar, Beige	Roof P				
45	90	Chimney Brick Mortar, Beige	Roof P				
46	91	Duct Insulation Tar Paper, Black	Roof I				
46	92	Duct Insulation Tar Paper, Black	Roof I				
47	93	Pitch Pocket Tar, Black	Roof I				
47	94	Pitch Pocket Tar, Black	Roof I				
48	95	Fascia & Coping Stone Caulking, Beige	Roof G				
48	96	Fascia & Coping Stone Caulking, Beige	Roof G				
CHAIN OF CUSTODY							
Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Luis Nevarez		01/10/2020					
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
Unique Mccoy	UM	1/10/20	5:52 PM				

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.


Omara Rana... 1/14/20

J #1/12/20 7:54 PM

1.14.2020

1/14/20
062000652

20 JAN 10 PM 5:52
CARLE PLACE NY

		ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY				PAGE <u>9</u> OF <u> </u>	
PROJECT NO.: 2043479.28 CLIENT: H.O.H.U.F.S.D PROJECT SITE: Hastings MS/HS @ 27 Farragut Ave, Hastings-on-Hudson, NY 10706 Project Manager: M. Luccioni				LOCATION(S) SURVEYED: Various Interior & Exterior PROPOSED PROJECT: Interior & Exterior Renovations DATE(S) OF INSPECTION: 12/27 & 30/19 Inspector(s): M. Luccioni & L. Nevarez			
WSP TELEPHONE NO.: (914) 798-3710 ADDRESS: 565 Taxter Road Suite 510, Elmsford, NY 10523				RESULTS TO: Mluccioni@wsp.com		TURNAROUND TIME: <input type="checkbox"/> 3 HR. <input type="checkbox"/> 6 HR <input type="checkbox"/> 24 HR <input type="checkbox"/> 48 HR. <input checked="" type="checkbox"/> 72 HR. <input type="checkbox"/> OTHER _____	
HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES		
49	97	Perimeter Cap Flash Caulking, Gray	Roof G		20 JAN 10 PM 5:52 FILED CLERK NY		
49	98	Perimeter Cap Flash Caulking, Gray	Roof G				
50	99	ROOFING MEMBRANE & TAR, BLACK	Roof C				
50	100	↓	Roof C				
51	101	PELT PAPER TO FOAM, BLACK (BOT.)	Roof K				
51	102	↓	Roof L				
52	103	PERCITE INSULATION, BROWN (2nd)	Roof K				
52	104	↓	Roof L				
53	105	ROOFING MEMBRANE, BLACK (TOP)	Roof K				
53	106	↓	Roof L				
54	107	TAR, BLACK (BOT.)	Roof G		ON CONCRETE		
54	108	↓	Roof I				

CHAIN OF CUSTODY

Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Luis Nevarez		01/10/2020									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
Unique Mexico	um	1/10/20	5:52 PM								

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group. *1/14/20*

Donato Benitez 1/14/20 1/12/20 7044 all 1.14.2020 062000652



ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PROJECT NO.: 2043479.28

CLIENT: H.O.H.U.F.S.D

PROJECT SITE: Hastings MS/HS @ 27 Farragut Ave, Hastings-on-Hudson, NY 10706

Project Manager: M. Luccioni

LOCATION(S) SURVEYED: Various Interior & Exterior

PROPOSED PROJECT: Interior & Exterior Renovations

DATE(S) OF INSPECTION: 12/27 & 30/19

Inspector(s): M. Luccioni & L. Nevarez

WSP

TELEPHONE NO. : (914) 798-3710

ADDRESS: 565 Taxter Road Suite 510, Elmsford, NY 10523

RESULTS TO: [Mluccioni@wsp.com](mailto:mluccioni@wsp.com)

TURNAROUND TIME: ☐ 3 HR. ☐ 6 HR ☐ 24 HR

☐ 48 HR. ☒ 72 HR. ☐ OTHER

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
55	109	SCUM FABRIC, BLACK (TOP) ↓	Roof G		
55	110	↓	Roof I		
56	111	PERIMETER CAP FLASHING. MEMBRANE & TAR, BLACK	Roof G		
56	112	↓	Roof B		
57	113	CURB FLASHING & TAR, BLACK	Roof A		
57	114	↓	Roof F		

20 JAN 10 PM 5:52
SAMPLE PLACE, NY
MURPHY DATA INC.

CHAIN OF CUSTODY

Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Luis Nevarez		01/10/2020									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
Unique McKay	um	11/10/20	5:57 pm								

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

11/14/20

Chandra Russell 11/4/20

$\gamma(1/2, 2/3)$ 704

1.142

062 000652



**APPENDIX C:
ASBESTOS BULK SAMPLE
LOCATION DRAWINGS**



SCALE: 1" = 19'-0"

565 TAXTER ROAD, SUITE 510
ELMSFORD, NY 10523
TEL. 914.798.3710 FAX 914.592.1734 WWW.WSP.COM

[illegible]

"ALTERATION OF THIS DOCUMENT EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL"			
DESIGNED BY:	DRAWN BY: JP	CHECKED BY: ML	REVIEWED BY: CN
PROJECT No.: 2043479.28	DATE: 01/16/2020	SCALE: AS SHOWN	

Hastings-on-Hudson Union Free School District

Upgrades to Farragut Middle School and High School



27 Farragut Avenue
Hastings-on-Hudson, NY 10706

CONTRACT	SON-H FARRAGUT MS
----------	-------------------

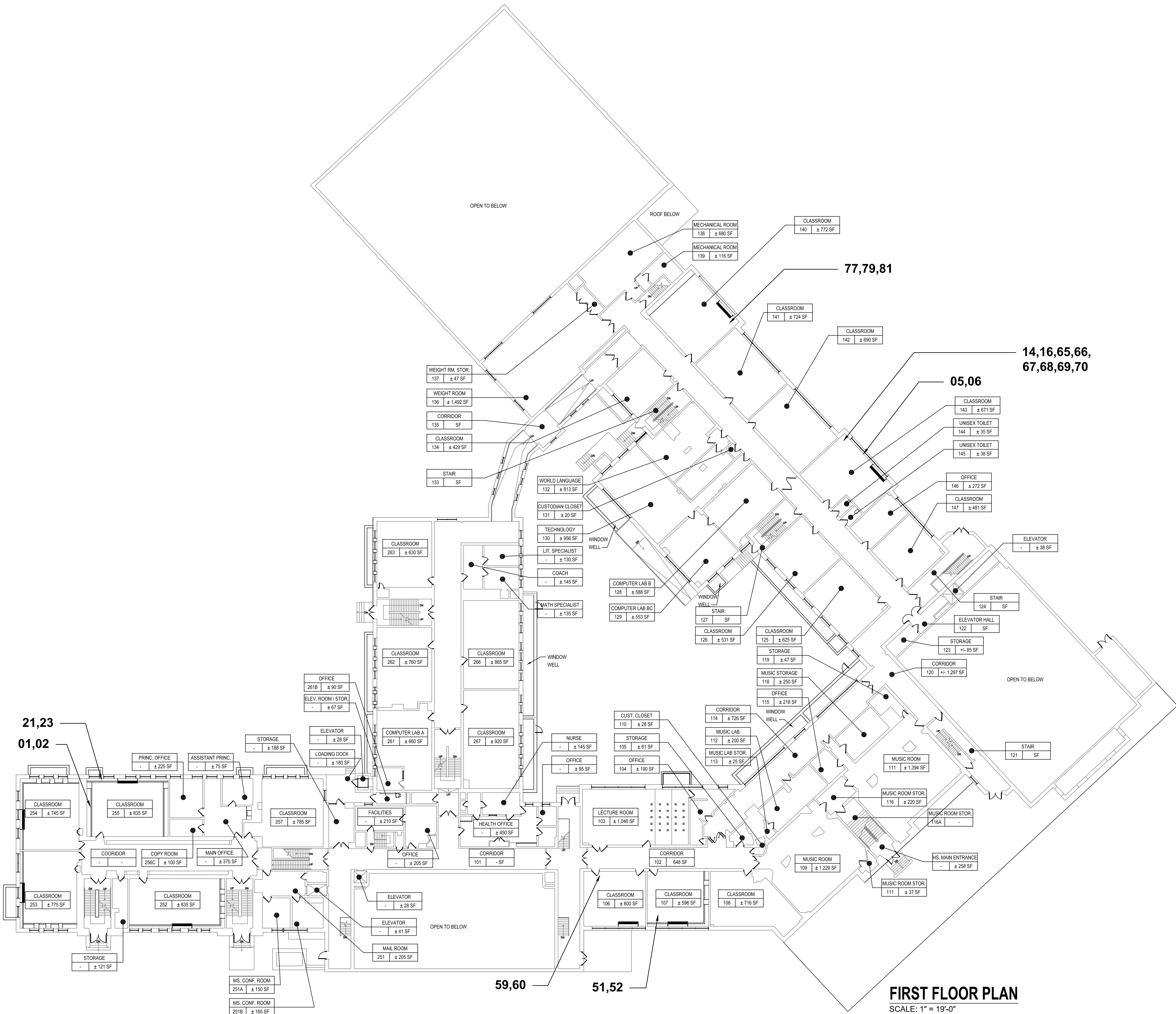
STATUS

SHEET TITLE

**BULK SAMPLE LOCATIONS
BASEMENT FLOOR PLAN**

DRAWING No. **BSL001**

M:\M:\NYCCAD\CADTEMP\2020\SCHOOL DISTRICT\2043479.28 - HASTINGS-ON-H FARRAGUT MS - HS\FARRAGUT MS-HS- BSL001-BSL005.dwg Plotted on: Jan 16, 2020 - 11:07am Plotted by: jape rez



CONSULTANTS:

wsp

565 TAXTER ROAD, SUITE 510
ELMSFORD, NY 10523
TEL. 914.798.3710 FAX 914.592.1734 WWW.WSP.COM

[illegible]

"ALTERATION OF THIS DOCUMENT EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL."			
DESIGNED BY:	DRAWN BY: JP	CHECKED BY: ML	REVIEWED BY: CN
PROJECT No.: 2043479.28	DATE: 01/16/2020		SCALE: AS SHOWN

CLIENT

**Hastings-on-Hudson
Union Free School
District**

Upgrades to Farragut Middle School and High School



27 Farragut Avenue
Hastings-on-Hudson, NY 10706

CONTRACT

STATUS	
--------	--

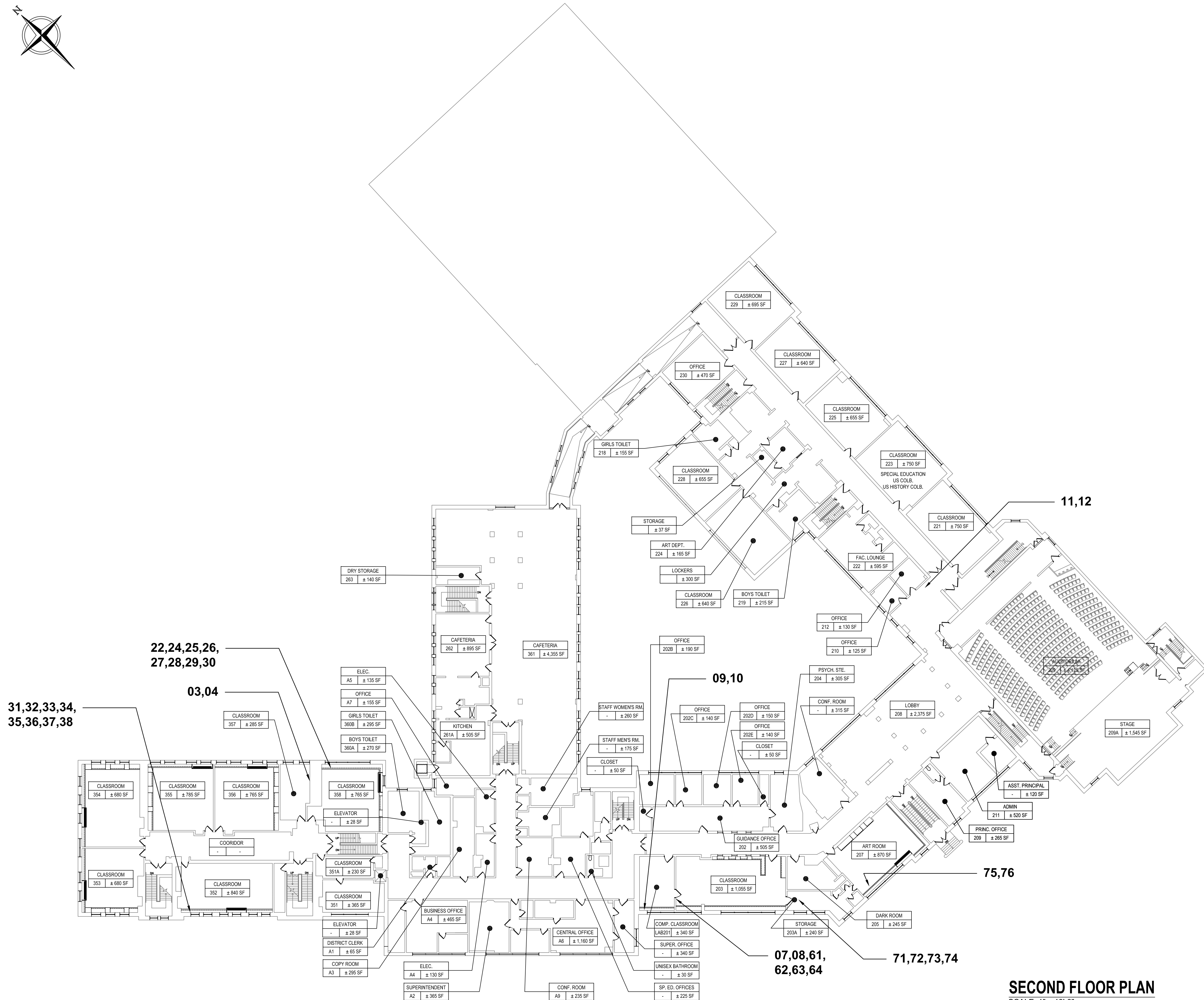
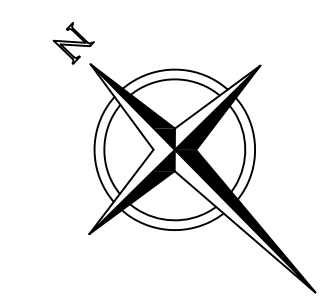
SHEET TITLE

**BULK SAMPLE LOCATIONS
FIRST FLOOR PLAN**

DRAWING No. _____

BSL002

M:\NYCCADICADTEMP-2020\SCHOOL DISTRICT\2043479.28 - HASTINGS-ON-H FARRAGUT MS - HS\FARRAGUT MS-HS- BSL001-BSL005.dwg Last Modified: Jan 16, 2020 - 11:07am Plotted on: Jan 16, 2020 - 11:10am By: japeréz



SECOND FLOOR PLAN

SCALE: 1" = 19'-0"

CONSULTANTS:

wsp

565 TAXTER ROAD, SUITE 510
ELMSFORD, NY 10523
TEL. 914.798.3710 FAX 914.592.1734 WWW.WSP.COM

[illegible]

"ALTERATION OF THIS DOCUMENT EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL."			
DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
	JP	ML	CN
PROJECT No.:	DATE:	SCALE:	
2043479.27	01/16/2020	AS SHOWN	

CLIENT

Hastings-on-Hudson Union Free School District

Upgrades to Farragut Middle School and High School



27 Farragut Avenue
Hastings-on-Hudson, NY 10706

CONTRACT

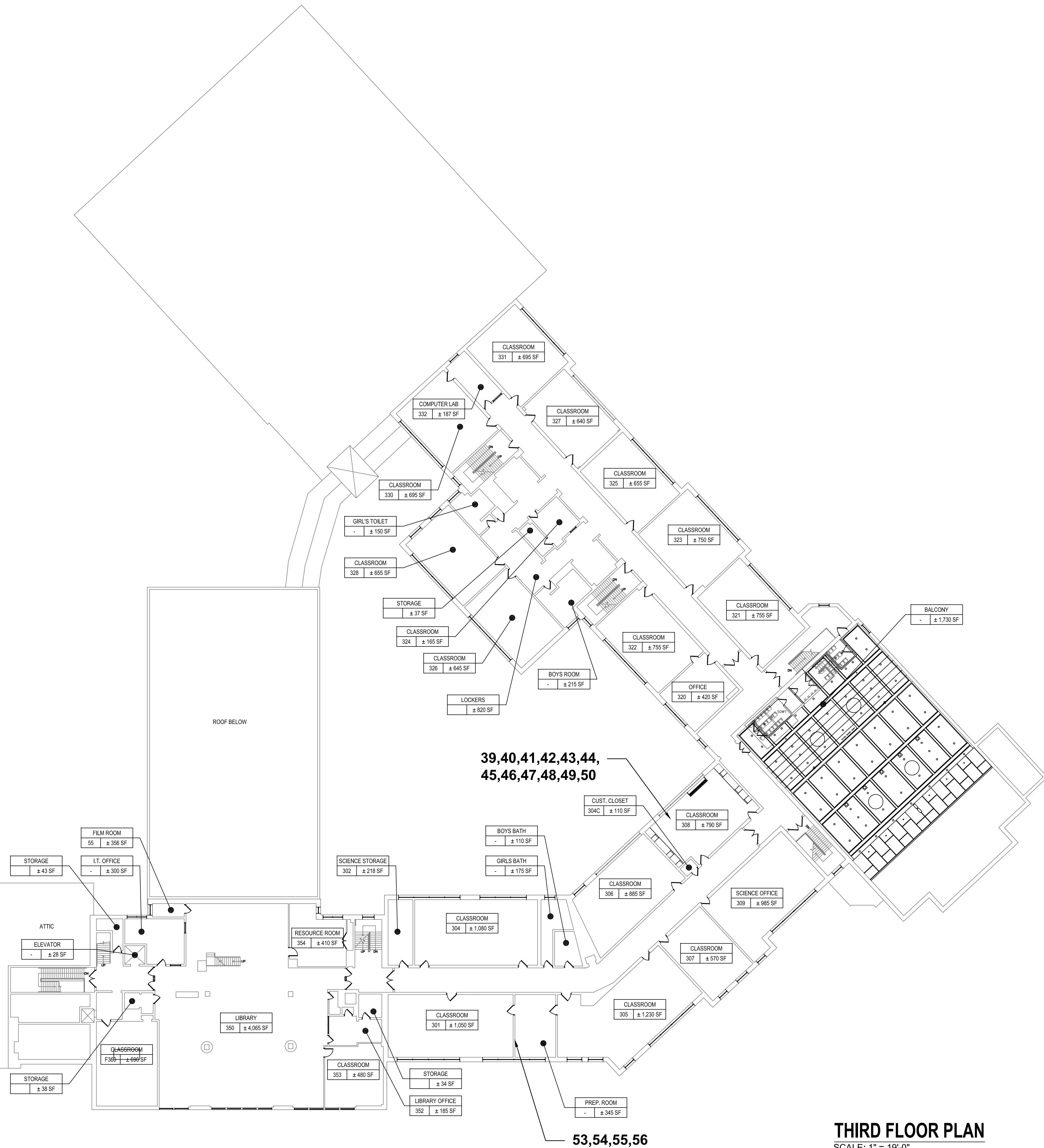
STATUS	
--------	--

SHEET TITLE

**BULK SAMPLE LOCATIONS
SECOND FLOOR PLAN**

DRAWING No. **BSL003**

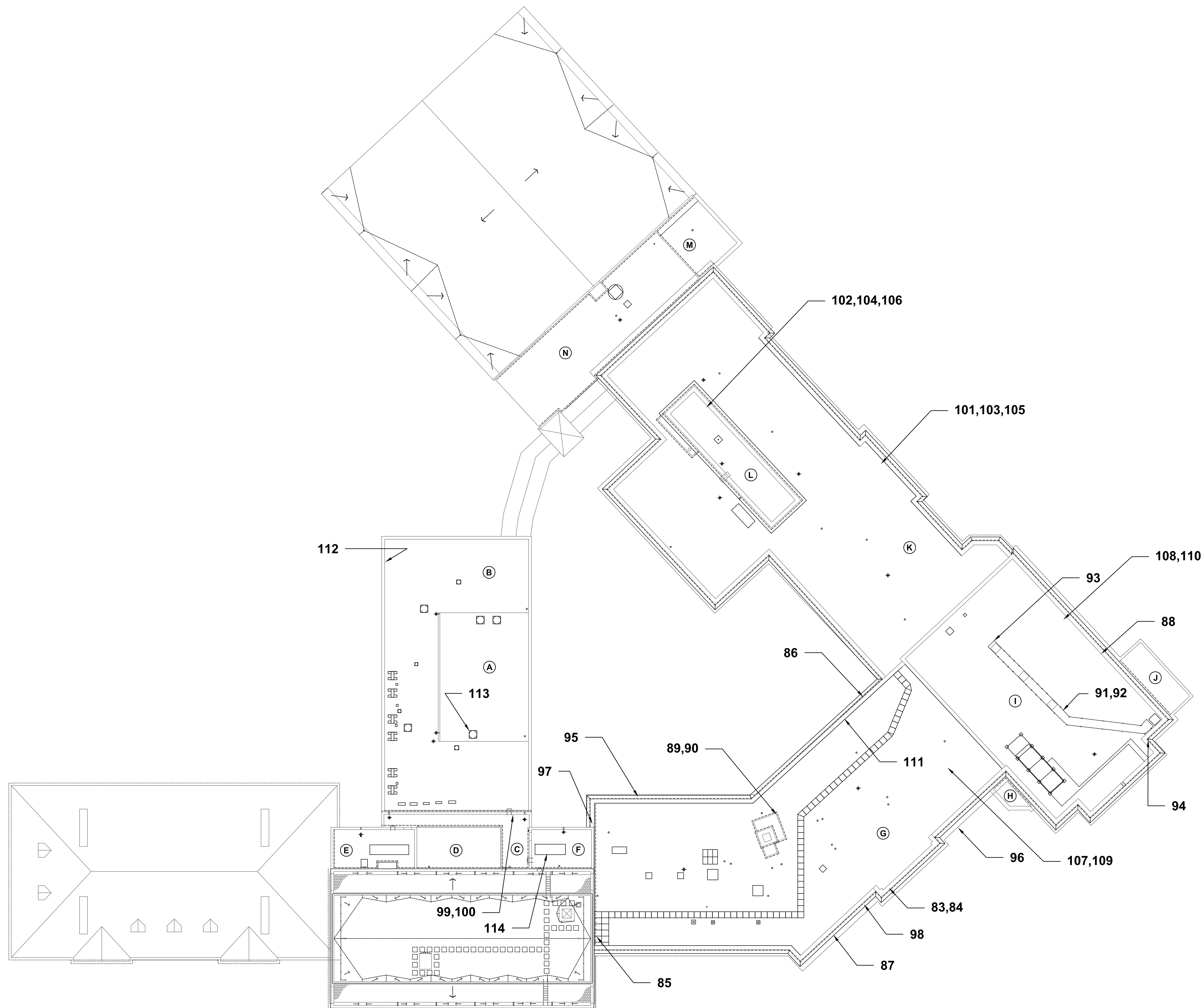
M:\NYCCAD\CADTEMP-2020\SCHOOL DISTRICT\2043479.28 - HASTINGS-ON-H FARRAGUT MS - HS\FARRAGUT MS-HS- BSL001+BSL005.dwg Last Modified: Jan 16, 2020 - 11:07am Plotted on: Jan 16, 2020 - 11:11am By:japerez



SCALE: 1" = 19'-0"

BSL004

M:\NYCCAD\CADTEMP\2020\SCHOOL DISTRICT\2043479_28 - HASTINGS-ON-H FARRAGUT MS - HS\FARRAGUT MS-HS- BSL001-BSL005.dwg Last Modified: Jan 16, 2020 - 11:13am Plotted on: Jan 16, 2020 - 11:24am By japerrez



CONSULTANTS:

wsp

565 TAXTER ROAD, SUITE 510
ELMSFORD, NY 10523
TEL. 914.798.3710 FAX 914.592.1734 WWW.WSP.COM

[illegible]

"ALTERATION OF THIS DOCUMENT EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL."			
DESIGNED BY:	DRAWN BY: JP	CHECKED BY: ML	REVIEWED BY: CN
PROJECT No.: 2043479.28	DATE: 01/16/2020		SCALE: AS SHOWN

CLIENT **Hastings-on-Hudson
Union Free School
District**

Upgrades to Farragut Middle School and High School



27 Farragut Avenue
Hastings-on-Hudson, NY 10706

CONTRACT

	STATUS
--	--------

SHEET TITLE

**BULK SAMPLE LOCATIONS
ROOF PLAN**

DRAWING No.

BSL005

WWW.CCAD/CADDTEMP/2020/SCHOOL_DISTRICT/043479.28 - HASTINGS-ON-H FARRAGUT MS - HS/FARRAGUT MS-HS - BSL001-BSL005.dwg Last Modified: Jan 16, 2020 - 11:13am Plotted on: Jan 16, 2020 - 11:24am By: jaynez



**APPENDIX D:
ASBESTOS CONTAINING MATERIALS
LOCATION DRAWINGS**

[illegible]

CLIENT

**Hastings-on-Hudson
Union Free School
District**

A cartoon illustration of a bee with a yellow and black striped body, large eyes, and a wide smile. It is wearing a green vest with a yellow number '1' on it. The bee is in a dynamic, jumping pose with its arms and legs outstretched.

CONTRACT

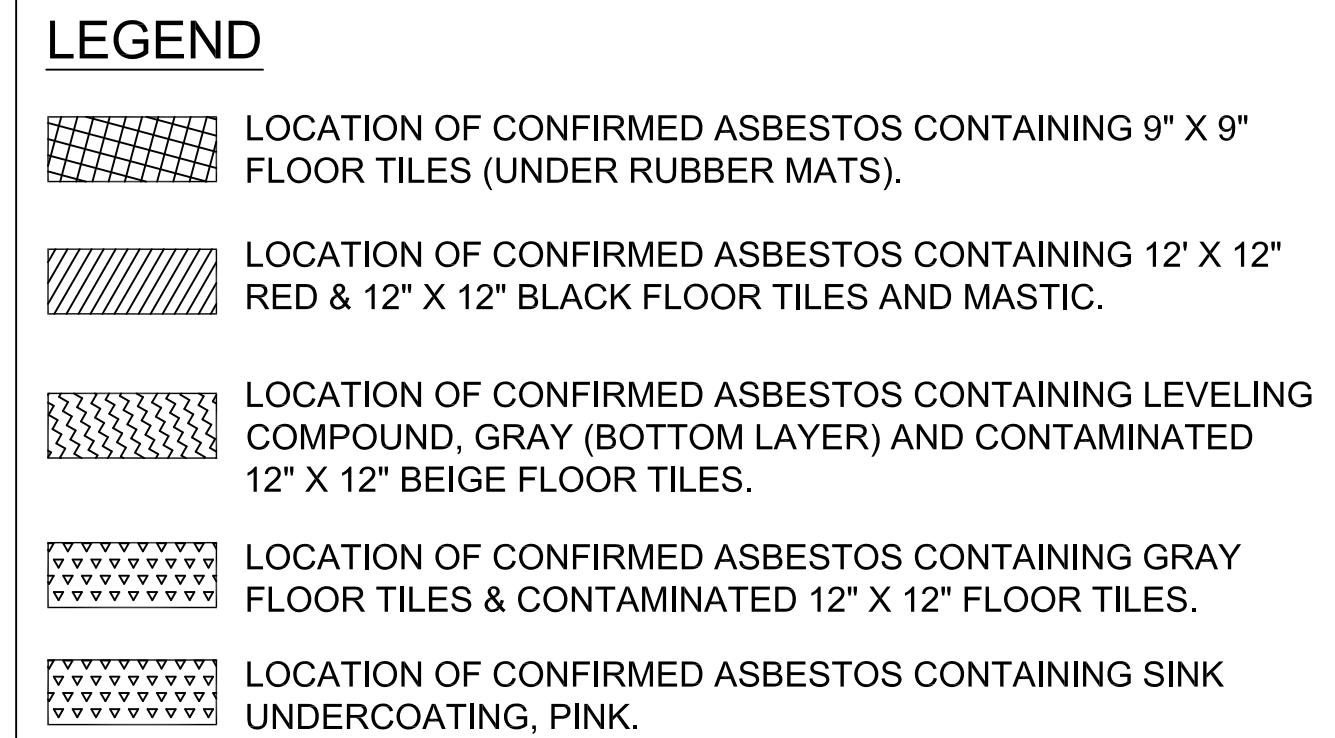
STATUS

SHEET TITLE

**ASBESTOS CONTAINING
MATERIALS
BASEMENT FLOOR PLAN**

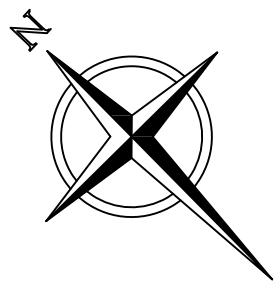
DRAWING No. **ACM001**

NYCCADICADTEMP-2020\SCHOOL DISTRICT\2043479.28 - HASTINGS-ON-H FARRAGUT MS - HS\FARRAGUT MS-HS- ACM001-ACM006.dwg Last Modified: Jan 16, 2020 - 12:51pm Plotted on: Jan 16, 2020 - 2:18pm By: joperez



DRAWING No. **ACM002**

AKNYCCAD/CADOTEMP-2070/SCHOOL_DISTRICT/203439_28 - HASTINGS-QW-FARRAGUT MS-HS-FARRAGUT MS-HS-AK001-AK0005.dwg Last Modified: Jan 16, 2020 - 1:51pm Plotted on: Jan 16, 2020 - 2:22pm By jacobrez

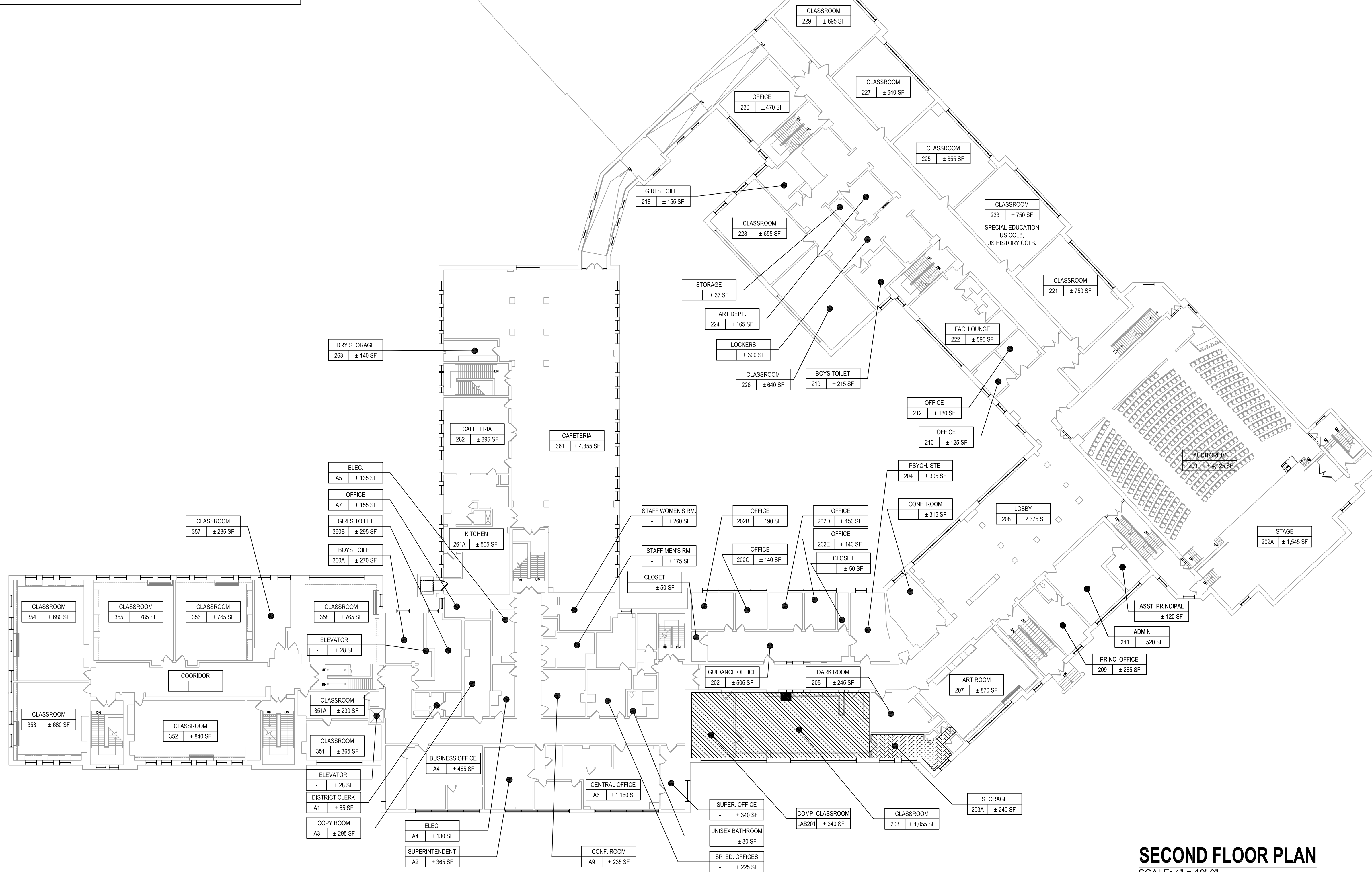


LEGEND

 LOCATION OF CONFIRMED ASBESTOS CONTAINING
12" X 12" BROWN FLOOR TILES.

 LOCATION OF CONFIRMED ASBESTOS CONTAINING BROWN VINYL FLOORING

 LOCATION OF CONFIRMED ASBESTOS CONTAINING SINK UNDERCOATING, PINK.



SECOND FLOOR PLAN

SCALE: 1" = 19'-0"

CONSULTANTS:



565 TAXTER ROAD, SUITE 510
ELMSFORD, NY 10523
TEL. 914.798.3710 FAX 914.592.1734 WWW.WSP.COM

[illegible]

"ALTERATION OF THIS DOCUMENT EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL"

DESIGNED BY:	DRAWN BY: JP	CHECKED BY: ML	REVIEWED BY: CN
PROJECT No.: 2043479.28	DATE: 01/16/2020	SCALE: AS SHOWN	

CLIENT

Hastings-on-Hudson Union Free School District

Upgrades to Farragut Middle School and High School



27 Farragut Avenue
Hastings-on-Hudson, NY 10706

CONTRACT

STATUS

SHEET TITLE

**ASBESTOS CONTAINING
MATERIALS
SECOND FLOOR PLAN**

DRAWING No.

ACM003

MINNYCADD/CADD/TEMP-3020/SCHOOL DISTRICT 204/479.28 - HASTINGS-ON-H FARRAGUT INS - HSFARRAGUT INS-HS-ACMI01-ACMI006.dwg Last Modified: Jan 16, 2020 - 2:25pm Plotted on: Jan 16, 2020 - 5:02pm By:japerez



Architectural floor plan of a school building. The plan shows various rooms and their approximate square footages (SF). The layout includes a large central area with multiple classrooms, a library, a resource room, a computer lab, a film room, and several restrooms. A large roof area is indicated on the left side. The plan also shows a series of rooms on the right side, including a balcony and a custodial closet.

Rooms and their approximate square footages (SF):

- CLASSROOM 331: ± 695 SF
- CLASSROOM 327: ± 640 SF
- CLASSROOM 325: ± 655 SF
- CLASSROOM 323: ± 750 SF
- CLASSROOM 321: ± 755 SF
- CLASSROOM 322: ± 755 SF
- CLASSROOM 320: ± 420 SF
- CLASSROOM 308: ± 790 SF
- CLASSROOM 306: ± 885 SF
- CLASSROOM 309: ± 985 SF
- CLASSROOM 307: ± 570 SF
- CLASSROOM 305: ± 1,230 SF
- CLASSROOM 304: ± 1,080 SF
- CLASSROOM 301: ± 1,050 SF
- CLASSROOM 303: ± 480 SF
- CLASSROOM 350: ± 4,065 SF
- CLASSROOM 332: ± 187 SF
- CLASSROOM 330: ± 695 SF
- CLASSROOM 328: ± 655 SF
- CLASSROOM 324: ± 165 SF
- CLASSROOM 326: ± 645 SF
- CLASSROOM 302: ± 218 SF
- CLASSROOM 354: ± 410 SF
- CLASSROOM 353: ± 480 SF
- CLASSROOM 352: ± 185 SF
- COMPUTER LAB 332: ± 187 SF
- GIRL'S TOILET: ± 150 SF
- STORAGE: ± 37 SF
- BOYS ROOM: ± 215 SF
- LOCKERS: ± 820 SF
- BOYS BATH: ± 110 SF
- GIRLS BATH: ± 175 SF
- SCIENCE STORAGE 302: ± 218 SF
- RESOURCE ROOM 354: ± 410 SF
- LIBRARY 350: ± 4,065 SF
- LIBRARY OFFICE 352: ± 185 SF
- STORAGE: ± 34 SF
- PREP. ROOM: ± 345 SF
- SCIENCE OFFICE 309: ± 985 SF
- CUST. CLOSET 340C: ± 110 SF
- BALCONY: ± 1,730 SF
- FILM ROOM 55: ± 356 SF
- I.T. OFFICE: ± 300 SF
- CLASSROOM F309: ± 690 SF
- ROOF BELOW

CONSULTANTS:

wsp

565 TAXTER ROAD, SUITE 510
ELMSFORD, NY 10523
TEL. 914.798.3710 FAX 914.592.1734 WWW.WSP.COM

[illegible]

"ALTERATION OF THIS DOCUMENT EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL."			
DESIGNED BY:	DRAWN BY: JP	CHECKED BY: ML	REVIEWED BY: CN
PROJECT No.: 2043479.28	DATE: 01/16/2020	SCALE: AS SHOWN	

CLIENT

**Hastings-on-Hudson
Union Free School
District**

Upgrades to Farragut Middle School and High School



27 Farragut Avenue
Hastings-on-Hudson, NY 10706

CONTRACT

STATUS

SHEET TITLE

**ASBESTOS CONTAINING
MATERIALS
THIRD FLOOR PLAN**

DRAWING No. _____

ACM004

FILE:NYCCADICADDTEMP-2020\SCHOOL DISTRICT\204\3475.28 - HASTINGS-ON-H FARRAGUT MS - HS\FARRAGUT MS-HS-ACN001-ACI0006.dwg Last Modified: Jan 16, 2020 - 12:51pm Plotted on: Jan 16, 2020 - 2:26pm By:japeraz



**APPENDIX E:
LEAD XRF ANALYSIS RESULTS**



Report for Environmental Inspection Services

SAMPLE LOCATION	BUILDING COMPONENT	COLOR	SUBSTRATE	CONDITION	LEAD CONTENT (mg/cm2)
Samples Collected on 01/8/20 by WSP					
Calibration Check @ 1.0	---	---	---	---	1.0
Calibration Check @ 1.0	---	---	---	---	1.1
Calibration Check @ 1.0	---	---	---	---	1.2
Calibration Check @ 0.0	---	---	---	---	0.0
Calibration Check @ 0.0	---	---	---	---	0.0
Calibration Check @ 0.0	---	---	---	---	0.1
1 st Floor Room 143	Wall	Blue	Plaster	Good	0.1
3 rd Floor Room 353	Wall	Yellow	Plaster	Good	0.0
3 rd Floor Room 353	Wall	Yellow	Drywall	Good	0.1
Elevator Mech Room	Door & Frame	Brown	Metal	Good	0.2
2 nd Floor Room 201	Wall	Beige	Plaster	Good	0.1
Calibration Check @ 1.0	---	---	---	---	1.2
Calibration Check @ 1.0	---	---	---	---	1.2
Calibration Check @ 1.0	---	---	---	---	1.2
Calibration Check @ 0.0	---	---	---	---	0.2
Calibration Check @ 0.0	---	---	---	---	0.2
Calibration Check @ 0.0	---	---	---	---	0.1

Bold = Positive for LEAD



**APPENDIX F:
PCB BULK SAMPLE
CHAIN OF CUSTODY & LABORATORY RESULTS**



**APPENDIX G:
COMPANY & PERSONNEL CERTIFICATIONS
& LABORATORY ACCREDITATIONS**

New York State – Department of Labor

Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

Louis Berger, U.S., Inc.
8th Floor
96 Morton Street
New York, NY 10014

FILE NUMBER: 19-132876
LICENSE NUMBER: 132876
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 02/14/2019
EXPIRATION DATE: 02/29/2020

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.



Eileen M. Franko, Director
For the Commissioner of Labor

United States Environmental Protection Agency

This is to certify that

Louis Berger U.S., Inc.

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires March 20, 2022

LBP-F199603-1

Certification #

March 06, 2019

Issued On



Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE



MARVIN LUCCIONI
CLASS(EXPIRES)
C ATEC(02/20) D INSP(02/20)
H PM (02/20) I PD (02/20)

CERT# 03-11021
DMV# 992503906

MUST BE CARRIED ON ASBESTOS PROJECTS

STANDARD SECURITY NUMBER 000000000000



**Department
of Labor**

LUIS A NEVAREZ

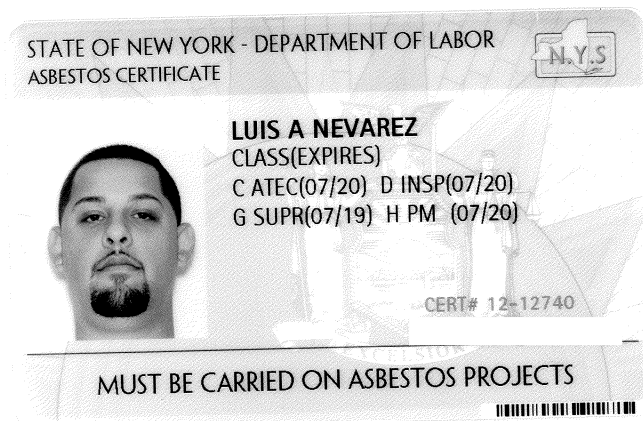
C/O LOUIS BERGER, 96 MORTON ST APT 8FL
NEW YORK NY 10014

Enclosed is your new card.

NYS Department of Labor

The Department of Labor is happy to provide this improved card. We welcome your comments:
nysdol@labor.ny.gov or call (518) 457-2735

YOUR NEW CARD





**APPENDIX H:
PHOTOGRAPHIC DOCUMENTATION**