ORANGE-ULSTER BOCES

INTERIOR ALTERATIONS-THIRD FLOOR REGIONAL EDUCATION CENTER AT ARDEN HILL

4 HARRIMAN DRIVE GOSHEN, NEW YORK 10924 SED # 44-90-00-00-8-035-008

ORANGE ULSTER BOCES 53 GIBSON ROAD GOSHEN, NEW YORK 10924

ARCHITECT: KG+D ARCHITECTS, PC

285 Main Street

Mount Kisco, NY 10549

MEP ENGINEER: GERARD ASSOCIATES

CONSULTING ENGINEERS

223 Main Street Goshen, NY 10924

BID ISSUE 22 SEPTEMBER 2023

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For

INTERIOR ALTERATIONS THIRD FLOOR

AT THE REGIONAL EDUCATION CENTER AT ARDEN HILL

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ADVERTISEMENT FOR BIDS

Orange-Ulster BOCES will receive individual sealed proposals before October 13, 2023 at 2:00pm for:

INTERIOR ALTERATIONS AT THE REGIONAL EDUCATION CENTER AT ARDEN HILL

4 HARRIMAN DRIVE GOSHEN, NEW YORK 10924 SED # 44-90-00-00-8-035-008

ORANGE ULSTER BOCES 53 GIBSON ROAD GOSHEN, NEW YORK 10924

The Owner will receive the proposals at the Business / Administration Office, 103 Gibson Road Goshen, New York 10924, and at that time all proposals that have been received in accordance with the terms hereof will be publicly opened and read aloud.

The Owner invites bidders to bid on the work described in the Bid Documents that falls within the following bid package:

Contract No. Trade

1 General Construction

See the Bid Documents for a further description of the scope of work.

Bidders must use the Bid Proposal Forms included with the Bid Documents to make their proposals, and each proposal must be made in accordance with those Forms.

The contract awarded pursuant to this bid will require the contractor to enter into the Project Labor Agreement include in the Bid Documents. Accordingly. Pursuant to Section 222 of the New York labor Law, this bid is exempt from the requirement for separate specifications (known as the Wicks Law). Each bidder shall submit with its bid a separate sealed list that names each subcontractor that the Bidder will use to perform work on the contract, and the agreed-upon amount to be paid to each, for: (a) plumbing, (b) heating, ventilating and air conditioning apparatus and (c) electric wiring, equipment, and standard illuminating fixtures.

Bidders may obtain the Bid Documents on September 22, 2023. Complete digital sets of Bidding Documents may be obtained online as a download at the following website: https://revplans.biddyhq.com/. Follow instructions to create an account or login if already registered. Select the "Projects" tab at the top of the screen and use the search function if needed to view this project. All bidders are urged to register to ensure receipt of all necessary information, including Bid Addenda.

Complete hard copy sets of Bidding Documents, which include Drawings, Specifications and Addenda, may be obtained from REVplans, 28 Church Street, Unit 7, Warwick, NY, 10990, 845-651-3845. upon depositing the sum of \$100 per set. Deposit checks or money orders shall be made payable to *Orange Ulster BOCES*. Plan deposits are refundable to all bidders submitting bids in accordance with NYS law and the terms in the Instructions to Bidders section of the Specifications. Any plan holder requiring document shipping shall make such arrangements with REVplans and be responsible for paying all packaging and shipping costs.

Please note REVplans (revplans.biddyhq.com) is the designated location and means of distributing all bid package information. REVplans takes no responsibility for the accuracy or completeness of Bidding Documents obtained from other sources. Obtaining Bidding Documents through REVplans enables a prospective bidder to be identified as a registered plan holder. All Bid Addenda issued after initial document download will be transmitted to registered plan holders via email and will be available at https://revplans.biddyhq.com/. Plan holders who have paid for hard copies of the Bidding Documents may coordinate directly with REVplans if hard copies of Bid Addenda are needed. There is no charge for registered plan holders to obtain hard copies of the Bid Addenda.

There will be a pre-bid site meeting on October 3, 2023 at 3:00pm at the Terrence L Olivo Building (Main Building) at the Regional Education Center at Arden Hill, 4 Harriman Drive Goshen, NY 10924. Bidders are urged to attend the site meeting. Knowledge of the field conditions is crucial to understanding the Work.

Each proposal must be accompanied by a certified check payable to Orange-Ulster BOCES or by a Bid Bond for a sum equal to five percent (5%) of the bid, conditioned as set forth in the Instructions to Bidders. All bid security, except those of the three low bidders, will be returned within four days after proposals are submitted. The bid security provided by the three low bidders will be returned after the execution of the Trade Contract and the Project labor Agreement. 45 days after the opening of the bids, if the bidder has not received notice of contract award, upon bidder's request, the bid security will be returned.

The Owner may require the successful bidder to provide separate Performance and Labor & Materials Payment Bonds in the amount of the contract price and in the form specified in the Bid Documents. As required by Section 222 of the New York Labor Law, the Owner will require each contractor and subcontractor performing work on the Project to participate in apprentice training programs in the trades of work it employs, which programs must have been approved by the New York State Department of labor for not less than three (3) years and must have at least one apprentice currently enrolled in the training program.

All laborers, workers and mechanics working on the site of this project must be certified as having successfully completed the OSHA 10-hour construction safety and health course.

To the fullest extent allowed by law, the Owner reserves the right to reject bids that contain omissions, exceptions or modifications, or in their sole discretion to waive such irregularities, or to reject any or all bids or to accept any bid which is in the best interest of the District.

All proposals shall be sealed and in an opaque envelope distinctly marked on the outside as follows:

Orange-Ulster BOCES – Interior Alterations at the Regional Education Center at Arden Hill Bid Opening Date: October 13, 2023 at 2:00pm Name of Bidder Marked "SEALED BID"

Such proposals must be delivered to the Business / Administration Office, 103 Gibson Road Goshen, New York 10924. The Owner will not open or consider any proposal unless it is received at that location by no later than the bid opening date and time. Bidders are solely responsible for the arrival of each bid proposal at the place of bid opening by the appointed time, regardless of the

means of delivery.

END OF ADVERTISEMENT

SECTION 002100 - INVITATION AND INSTRUCTIONS TO BIDDERS

1.1 OWNER, PROJECT, ARCHITECT, BID PROCEDURE

- A. The Owner, Orange-Ulster BOCES; invites sealed bids for the Interior Alterations Project at the Terrence L Olivo Building (Main Building) at the Regional Education Center at Arden Hill and related work all as described in the accompanying contract documents as prepared by KG+D Architects, P.C. 285 Main Street; Mt. Kisco, NY 10549
- B. Bids shall be received in accordance with the New York State Public Bidding Laws, this project will be executed under a SINGLE PRIME CONTRACT.

CONTRACT #1 - GENERAL CONSTRUCTION

- C. As a condition of being awarded a contract or subcontract for work covered by the Contract Documents, the successful Bidder and any subcontractor of any tier on this Project agrees to become signatory to, and to abide by, the provisions of the Project Labor Agreement ("PLA"). An unsigned copy of this Project Labor Agreement is included in the Specifications.
- D. Note this Project is not subject to the requirements of the "Wicks law". Pursuant to Section 222 of the New York labor Law, this bid is exempt from the requirement for separate specifications (known as the Wicks Law).
- E. Each bidder shall submit with its bid a separate sealed list that names each subcontractor that the Bidder will use to perform work on the contract, and the agreed-upon amount to be paid to each, for: (a) plumbing, (b) heating, ventilating and air conditioning apparatus and (c) electric wiring, equipment, and standard illuminating fixtures.
- F. After the low bid is announced, the sealed list of subcontractors submitted with such low bid shall be opened and the names of such subcontractors shall be announced, and thereafter any change of subcontractor or agreed-upon amount to be paid to each shall require the approval of the Owner, upon a showing presented to the Owner of legitimate construction need for such change, which shall be open to public inspection.
 - Legitimate construction need shall include, but not be limited to, a change in Project specifications, a change in construction material costs, a change to subcontractor status as determined pursuant to Section 222(2)(e) of the New York Labor Law, or the subcontractor has become otherwise 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.
- G. As required by Section 222 of the New York Labor Law, the Owner will require each contractor and subcontractor performing work on the Project to participate in apprentice training programs in the trades of work it employs, which programs must have been approved by the New York State Department of labor for not less than three (3) years and must have at least one apprentice currently enrolled in the training program.
- H. As required by Section 222 of the New York Labor Law, the design of the Project shall be subject to the review and approval of the Owner and the design and construction standards of the Project shall be subject to the review and approval of the Owner.

I. The attention of all Bidders is directed to the fact that a single set of documents exist for the construction of the Project as a whole and the delineation of the responsibilities serves as outlines only and all such work necessary and/or required to complete the individual trade obligations will be deemed to be included within said trade scope of work. Work on each sheet, or within any technical specification section may or may not have an effect on the work of any single trade. Failure on the part of any Contractor or subcontractor to examine all documents will not be cause for additional cost to the Owner.

1.2 DISCREPANCY

- A. Should any bidder find any discrepancies in, or omission from, the Contract Documents, or should the bidder be in doubt as to the meaning of any portion of said documents, they shall at once notify the Architect and obtain an interpretation or clarification prior to submission of their bid.
- B. <u>Any request for interpretation or clarification given in accordance with this provision shall be in writing.</u>
- C. The bidder may, during the bidding period, be advised by addendum of additions, deletions, or alterations in any of the documents forming a part of this Contract. All such additions, deletions or alterations shall be included in the work covered by the bid and shall become a part of this Contract. Upon such mailing or delivery and making available for inspection, such addendum shall become a part of the Contract Documents and shall be binding on all Bidders whether or not the Bidder receives or acknowledges the actual notice of such addendum. The requirements contained in all Contract Documents shall apply to all addenda.

CUTOFF DATE FOR RECEIPT OF REQUESTS FOR INFORMATION (RFI'S) SHALL BE OCTOBER 6, 2023 AT 5:00 PM

- D. RFIs shall be submitted in writing via email to the Architect, Attn: Brian Mangan bmangan@kgdarchitects.com
- E. Only interpretations, corrections or additional Contract provisions made in writing by the Architect as addenda shall be binding. No officer, agent or employee of the Owner or the Architect is authorized to explain or to interpret the Contract Documents by any other method and any such explanation or interpretation, if given, shall not be relied upon by the Bidder.
- F. If, in the interpretation of Bid Documents, requirements within the Drawings and Specifications conflict, or it appears that the Drawings and Specifications are not in agreement, the Contractor shall base his bid on (1) the greater quantity, where there is a discrepancy in quantity; and (2) the superior quality, where there is a discrepancy in quality.
- 1.3 REPRESENTATION Each bidder, by making their bid, represents that -
 - A. They have read and understand the Bidding Documents (consisting of the Project Manual, Drawings and Addenda (if any)) and their Bid is made in accordance therewith.
 - B. The Contractor shall familiarize themselves with the existing conditions, verify necessary field conditions to prepare an accurate proposal, perform all required measurements for the fabrication and installation of work, and assume complete responsibility for the accuracy of same.

C. All materials to be incorporated in the work shall be "asbestos free" in their manufacture.

1.4 DOCUMENTS

- A. Bidders may obtain the Bid Documents on September 22, 2023, from REVplans, 28 Church Street Unit 7, Warwick New York 10990 Tel: 845-651-3845. Complete digital sets of Bidding Documents, drawings and specifications, may be obtained online as a download at the following website: revplans.biddyhq.com Complete hard copy sets of Bidding Documents, drawings and specifications, may be obtained upon depositing the sum of \$100.00 for each combined set of documents.
- B. Checks or money orders shall be made payable to Orange-Ulster BOCES. The deposit is refundable in accordance with the terms in the Instructions to Bidders to all bidders submitting bids.
- C. Any bidder requiring documents to be shipped shall make arrangements with the printer and pay for all packaging and shipping costs.
- D. Please note REVplans (<u>revplans.biddyhq.com</u>) is the designated location 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.
- 1.5 INFORMATIONAL MEETING All bidders are advised that an informational meeting will be held as follows:
 - A. Date October 3, 2023
 - B. Local Prevailing Time 3:00 pm
 - C. Location: Main Entrance of School 4 Harriman Road, Goshen, NY 10924
 - D. Any and all questions that may arise as a result of this meeting will be recorded and answered by the Addendum process.

NOTE: ALL BIDDERS WILL BE PRESUMED TO HAVE FULL KNOWLEDGE OF THE SITE, AND ALL INFORMATION AVAILABLE AT THE PRE-BID WALK THROUGH. NO EXTRA COST OR TIME EXTENSIONS WILL BE GRANTED BECAUSE OF LACK OF KNOWLEDGE OF ON SITE CONDITIONS, APPARENT, OR DATA AVAILABLE DURING THE WALK THROUGH.

1.6 BIDDING

- A. Sealed bids, with the name and address of the Bidder and division of Work contained thereon, will be received at the Business / Administration Office, 103 Gibson Road, Goshen, NY 10924 on or before October 13, 2023 at 2:00 pm, Local Prevailing Time at which time all bids will be opened publicly and read aloud.
- B. All bids shall be submitted in duplicate on the Proposal Forms provided within the specifications and shall be submitted in an opaque sealed envelope with the following contained thereon:
 - Orange-Ulster BOCES Interior Alterations at the Regional Education Center at Arden Hill
 - 2. Bid Opening Date: October 13, 2023 at 2:00pm
 - 3. Name of Bidder.
 - 4. Marked "SEALED BID".
- C. All spaces on Proposal Form must be completed. All signatures shall be in ink and in longhand.
- D. No oral or telephonic proposals or modifications of proposals will be considered.

E. Any proposals containing exceptions or modifications may, at the Owner's option, be disqualified.

1.7 QUALIFICATIONS OF BIDDER

- A. The Owner may make such investigation as the Owner deems necessary to determine the responsibility of any Bidder or to determine the ability of any Bidder to perform the Work.
- B. Bidders shall furnish to the Owner all information and data required by the Owner, including complete financial data, within the time and in the form and manner required by the Owner.
- C. The Owner reserves the right to reject any bid if the evidence required by the Owner is not submitted as required or if the evidence submitted by or the investigation of any Bidder fails to satisfy the Owner that the Bidder is responsible or is able or qualified to carry out the obligations of the Contract or to complete the Work as contemplated.

1.8 POST BID PROCEDURES

- A. The responsibility of bidders and of their proposed subcontractors will be considered in making the award. The Owner through the Architect may make such investigation as the Owner deems necessary to determine the responsibility of any bidder or to determine the ability of any bidder to perform the Work.
- B. When requested by the Architect, bidders shall furnish all information and data required by the Owner, including financial data, within the time and in the form and manner required by the Owner. Upon notification from the Architect, the three apparent low bidders shall furnish within three (3) working days after the bid opening four (4) copies of the following information in writing:
 - 1. a signed and notarized bidder qualification statement (see Section 004513):
 - 2. the names, addresses and phone numbers of the subcontractors and suppliers that the bidder proposes to use on the project;
 - 3. the bidder's proposed site safety plan;
 - 4. a bar chart showing the bidders' proposed plan and schedule to complete the bidder's work in accordance with the phasing milestones outlined in Section 011000.
 - 5. the insurance certificates required by the Bid Documents;
 - 6. a proposed schedule of values for the bidder's work:
 - 7. a proposed list of submittals and a proposed schedule for making them, all keyed to the bar chart.
- C. After receipt of the above information, the Architect and Construction Manager will designate a time and place for a meeting between the Owner, the Architect, the Construction Manager, and the apparent low bidder. The apparent low bidder's principal, project manager and site superintendent will attend that meeting, at which time the parties will discuss the bidder's responsiveness, responsibility and qualifications.
- D. The Owner reserves the right to disapprove the use of any proposed Subcontractor and in such event the bidder shall submit the name of another Subcontractor in like manner within the time specified by the Architect.
- E. To the fullest extent allowed by law, the Owner reserves the right to reject any bid if the evidence required by the Owner is not submitted or fails to satisfy the Owner that the bidder is responsible, able and qualified to carry out the obligations of the

- Contract or to complete the Work as contemplated. The Owner will consider the information received under paragraphs A through D above in determining whether or not to accept a proposal.
- F. Acceptance of a proposal will be a notice in writing signed by a duly authorized representative of the Owner.
- G. Any Bidder whose proposal is accepted will be required to sign the Trade Contract and the PLA within ten (10) days after receiving notice of acceptance. If the Bidder whose proposal is accepted fails or refuses to sign the Trade Contract or the PLA or fails or refuses to provide Payment and Performance Bonds acceptable to the Owner or proof of the insurance required by the Contract Documents, the Owner shall deem the acceptance of the bid rescinded and may elect to accept the bid of the next lowest responsible Bidder.
- H. In the event that the Owner should reject the proposal of a bidder as provided above or otherwise, at the Owner's option, the Owner may elect to meet with the next lowest bidder and to consider the information as provided in paragraphs A through D above. In the event that the proposal of the next lowest bidder is rejected as provided above or otherwise, at the Owner's option, the Owner may elect to meet with the third lowest bidder and repeat the above process. At all times the Owner retains the right to reject all bids.

1.9 APPROVAL OF SUBCONTRACTORS

- A. Each bidder shall submit with its bid a separate sealed list that names each subcontractor that the Bidder will use to perform work on the contract, and the agreed-upon amount to be paid to each, for: (a) plumbing, (b) heating, ventilating and air conditioning apparatus and (c) electric wiring, equipment, and standard illuminating fixtures. When requested by the Owner, Bidders shall, within the time specified by the Owner, submit to the Owner the names of any other Subcontractors which the Bidder proposes to use on the Project.
- B. The Owner reserves the right to disapprove the use of any proposed Subcontractor and in such event the Bidder shall submit the name of another Subcontractor in like manner within the time specified by the Owner.
- C. The Owner reserves the right to reject any bid if the names of proposed Subcontractors are not submitted as required.

1.10 SECURITY AND BONDS (Coordinate with Section 006100)

- A. Every bid shall be accompanied by a Bid Bond in the amount of 5 percent of the Contract Sum drawn by a recognized surety authorized to conduct business in the State of New York and made payable to the Owner.
 - 1. Bid Security shall be submitted in a separate sealed envelope clearly identifying the company and project as well as the name and address of the Surety Company.
 - 2. Each Bond must be accompanied by a Power of Attorney, giving names of Attorneys-in-fact, and the extent of their bonding authority. All bonds shall be countersigned by a resident Agent and with a Surety Company or Corporation meeting the following qualifications:
 - a. Surety must be licensed to do business in the State of New York.
 - b. Surety shall be listed on the current U.S. Treasury Department Circular 570 entitled "Companies Holding Certificates of Authority" from the Secretary of the Treasury under the Act of Congress

- approved July, 30, 1974 (6 U.S.C., Sec. 6-13), as Acceptable Sureties on Federal Bonds.
- c. Surety must meet minimum rating requirements as published in current "Best's Key Rating Guide" as listed below:
 - 1. For contracts not exceeding \$250,000, the following shall apply for all bonding companies holding a certified guarantee agreement form, the Small Business Administration (a copy of said agreement must accompany the bond.)

Contract Amount	Financial Size	Policy Holder
	Category	Rating
\$0- (But not including)	Class VI	В
\$100,000		
\$100,000-(But not	Class X	A-
including) \$250,000		

- 2. On all bonds, the Surety shall be rated as equal to "A-" or better as to "Policy Holder Ratings" and "X" or better as to "Financial Size Category" by "Best's Key Rating Guide."
- 3. Limitations:
 - a. Bonding limits or bonding capacity refers to the limit or amount of bond acceptable on any one project.
 - The bonding limit for each contractor shall not exceed the amount listed on the above referenced U.S. Treasury Department List for the Surety issuing the bond.
- 4. All Surety companies are subject to approval and may be rejected by the Owner without cause, in the same manner that bids may be rejected.
- 5. Compliance: In the event any of the requirements outlined herein are not complied with, the Owner shall have the right to reject the bid or annul the Award of the Contract.
- B. Bid security will be returned to all except the three lowest bidders, after formal analysis and evaluation of bids. No bid will be withheld beyond the forty-five (45) day period stipulated above.
- C. Remaining bid security will be returned to bidders after Owner and successful bidder have executed the Agreement and the Owner has received and approved performance and payment bonds.
- D. If the required agreement has not been executed within the specified period of time after the bid opening, bid security of any bidder will be returned upon his request, provided he has not been notified of acceptance of his bid prior to the date of his request.
- E. Separate Performance and Payment Bonds will be required for the work. Each shall be in the amount of 100% of the Contract price.
- F. The Contractors shall include in their proposal amounts the total premiums for the performance and labor and material payment bonds as set forth in Section 006100.

1.11 TAX STATUS

A. The Owner, Orange-Ulster BOCES, is an educational non-profit institution and is

therefore "tax-exempt" in accordance with the applicable laws of the State of New York and with Chapter 32 of the Internal Revenue Code, as most recently amended, for collection of all sales and excise taxes.

B. Exemption Certificates will be furnished to each Respective Prime Contractor.

1.12 INSURANCE

A. Insurance as required by Article 17 of the Form of Agreement and as set forth in the Insurance Rider (Section 007002) shall be required of each Respective Prime Contractor and shall be of forms and limits required therein.

1.13 EQUIVALENCY CLAUSE (Coordinate with Section 012500)

- A. When in the project manual/specifications, two or more kinds, types, brands, or manufacturers of materials are named they are regarded as establishing the required standard of quality and not for the purpose of limiting competition.
- B. The contractor may select one of these items or, if the contractor desires to use any kind, type, brand, manufacturer or material other than those named in the specification, he shall, in accordance with the instructions set forth in "Post-Bid Requirements" herein, identify within three (3) days after bid submission, but in any event prior to award of contract, what kind, type, brand, or manufacturer is included in the base bid for the specified item following procedures set forth in Section 012500.
- C. Failure to so identify the perceived "equivalencies", will not relieve contractor from providing the specified items.

1.14 AWARD OF CONTRACT

- A. This notice is an offer to receive proposals for a contract and not an offer of a contract.
- B. The award of the Contract shall be made to the Bidder submitting the lowest bid if, in the opinion of the Owner, such Bidder is qualified to perform the Work involved, is responsible and reliable.
- C. Alternates, if stated in the Proposal Form, shall be chosen at the discretion of the Owner when awarding the Contract. The lowest bid will then be determined by adding to, or subtracting from, to the bidder's total base bid, all Alternates chosen by the Owner.
- D. The Bidder agrees to commence work within ten (10) days of receipt of a Notice To Proceed, Letter of Intent, and/or Execution of Contract whichever is earlier.
- E. To the fullest extent allowed by law, the Owner reserves the right to reject any bid or all bids, to re-advertise for new bids, to reject any bid that contains an omission(s), an exception(s) or a modification(s), or in its sole discretion to waive what it deems to be an informality or irregularity in the bidding process, to waive what it deems to be an informality, irregularity, omission or technical defect with respect to a specific bid proposal received and to afford any Bidder an opportunity to remedy any informality or irregularity if it is in the Owner's interest to do so.
- F. The award of the Contract shall not be construed as a guarantee by the Owner that the plant, equipment and the general scheme of operations of a Bidder is either adequate or suitable for the satisfactory performance of the Work or that other data supplied by a Bidder is accurate.

1.15 LAWS AND REGULATIONS

A. All applicable Federal, State, County, Municipal or other laws, orders, ordinances,

- rules and regulations of all Authorities having jurisdiction over construction work in the locality of the project shall apply to the Contract and shall be deemed to be included in the Contract as if fully set forth therein at length.
- B. This project is subject to wage determination as issued by the Department of Labor. Reference Section 008700.
- C. In accordance with the requirements of General Municipal Law §103-g, the bidder is required to include with its bid either (1) the "Certification of Compliance with the Iran Divestment Act" or, in the case where the bidder is unable to make such certification, (2) the form titled "Declaration of Bidder's Inability to Provide Certification of Compliance with the Iran Divestment Act".

1.16 ARREARS

A. No bids will be accepted from, or contracts awarded to, any person, persons, firms or vendors who are in arrears to the Municipality upon debt, or contract, or who is a defaulter as surety or otherwise upon obligations to the Municipality.

1.17 NONDISCRIMINATION

- A. Notwithstanding implementation of the Owner's Affirmative Action Plan, if any, all Contractors and Subcontractors of all tiers and vendors will be required to comply with all provisions of the Civil Rights Act of 1964, Executive Order 11246 of 24 September 1965 and the relevant "Laws", "Acts" rules, regulations and orders of the Labor Department of the State of New York as amended.
- B. Contractors and Subcontractors of all tiers and vendors will be required to comply with all provisions of the New York State Human Rights Law and shall not discriminate because of creed, race, color, sex, sexual orientation, national origin, religion, age, marital status, military status, familial status, domestic violence victim status, predisposing genetic characteristics, gender, gender identity or expression or disability in all employment practices including recruitment, solicitation for employment, hiring, firing, training, job assignments, promotion, compensation and other terms, conditions and privileges of employment.
- C. New York State strives to promote equality of economic opportunities for minority and women-owned business enterprises. New York State encourages including minority and women-owned business enterprises ("MWBEs") as bidders, subcontractors and suppliers on public procurement contracts. By submitting a bid, the Bidder(s) certifies that if it is awarded a Contract, (a) it will make commercially reasonable good faith efforts to utilize suppliers that are certified MWBEs, (b) to the extent subcontracting is needed and permitted by the Owner. Bidder will make commercially reasonable good faith efforts to utilize subcontractors, who are certified MWBEs and (c) Bidder will retain documentation of these efforts to be provided upon request to the Owner and/or New York State. Evidence of good faith efforts shall include, but not be limited to, the following: (a) copies of solicitations to MWBEs and any responses thereto; (b) explanation of the specific reasons each MWBE that responded to such solicitations was not selected; and (c) explanation of the specific steps undertaken for the purpose of subcontracting with or obtaining supplies from certified MWBEs.

1.18 TIME OF COMPLETION AND CHANGES TO THE WORK

A. Work set forth in the Contract Documents shall commence as stated in written Notice to Proceed, Letter of Intent or execution of the Contract (whichever is earlier) and shall be completed within the time stated in Section

- 011000 from said Notice, Letter, or Execution (whichever is earlier).
- B. Unless otherwise provided in the Contract Documents, costs for the purposes of a Change Order shall be limited to the following:
 - Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Owners Representative and Architect;
 - 2. Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
 - 3. Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
 - 4. Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
 - 5. Costs of supervision and field office personnel directly attributable to the change.
- C. The allowance for overhead and profit included in the total cost to the Owner shall be based on the following schedule:
 - 1. For the Contractor, for Work performed by the Contractor's own forces, mark-up shall not exceed 10 percent of the value of overhead and profit.
 - 2. For the Contractor, for Work performed by the Contractor's Subcontractor, 5 percent of the amount due the Subcontractor.
 - 3. For each Subcontractor, or Sub-subcontractor involved, for Work performed by that Subcontractor's own forces, mark-up shall not exceed 10 percent of the value of overhead and profit.
 - 4. For each Subcontractor, for Work performed by the Subcontractor's Subsubcontractors, 5 percent of the amount due the Sub-subcontractor.
- D. In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are Subcontracts, they shall be itemized also. Back-up data will be required to be submitted as well, in the form of proposals from subcontractors and/or written quotes for materials and equipment.

End of Invitation and Instructions

ATTACHMENT 1 – Part 155 Regulations

https://www.p12.nysed.gov/facplan/Laws_Regs/8NYCRR155.htm#_155_5_Uniform_Safety_Stds_for_Schl_Constr

8 CRR-NY 155.5NY-CRR - OFFICIAL COMPILATION OF CODES, RULES AND REGULATIONS OF THE STATE OF NEW YORK

TITLE 8. EDUCATION DEPARTMENT

CHAPTER II. REGULATIONS OF THE COMMISSIONER

SUBCHAPTER J. BUILDINGS AND TRANSPORTATION

PART 155. EDUCATIONAL FACILITIES

155.5 Uniform Safety Standards for School Construction and Maintenance Projects

(a) Monitoring of construction and maintenance activities.

The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy and shall be monitored during construction or maintenance activities for safety violations by school district personnel. It is the responsibility of the board of education or board of cooperative educational services to assure that these standards are continuously maintained when the building or any portion thereof is occupied.

(b) Investigation and disposition of complaints relating to health and safety received as a result of construction and maintenance activities.

Boards of education and boards of cooperative educational services shall follow procedures established under section 155.4(d)(7) of this Part.

- (c) Pre-construction testing and planning for construction projects.
- (1) Boards of education and boards of cooperative educational services shall assure that proper planning is made for safety of building occupants during construction. For all construction projects for which bids are issued on or after September 30, 1999, such boards shall assure that safety is addressed in the bid specifications and contract documents before contract documents are advertised for bid. All school areas to be disturbed during renovation or demolition shall be tested for lead and asbestos. Appropriate procedures to protect the health of building occupants shall be included in the final construction documents for bidding.
- (2) Boards of education and boards of cooperative educational services shall establish procedures for involvement of the health and safety committee to monitor safety during school construction projects. The health and safety committees in school districts other than in cities with one million inhabitants or more shall be expanded during construction projects to include the project architect, construction manager, and the contractors. Such committee shall meet periodically to review issues and address complaints related to health and safety resulting from the construction project. In the case of a city school district in a city of one million inhabitants or more, the board of

education shall submit procedures for protecting health and safety during construction to the commissioner for approval. Such procedures shall outline methods for compliance with this section.

- (3) The district emergency management plan shall be updated to reflect any changes necessary to accommodate the construction process, including an updated emergency exit plan indicating temporary exits required due to construction. Provisions shall be made for the emergency evacuation and relocation or release of students and staff in the event of a construction incident.
- (4) Fire drills shall be held to familiarize students and staff with temporary exits and revised emergency procedures whenever such temporary exits and revised emergency procedures are required.
- (d) Pre-construction notification of construction projects.

The board of education or board of cooperative educational services shall establish procedures for notification of parents, staff and the community in advance of a construction project of \$10,000 or more to be conducted in a school building while the building is occupied. Such procedures shall provide notice at least two months prior to the date on which construction is scheduled to begin, provided that in the case of emergency construction projects, such notice shall be provided as far in advance of the start of construction as is practicable. Such notice shall include information on the district's obligations under this section to provide a safe school environment during construction projects. Such notice requirement may be met by publication in district newsletters, direct mailings, or holding a public hearing on the project to inform parents, students, school personnel and community members.

- (e) General safety and security standards for construction projects.
- (1) All construction materials shall be stored in a safe and secure manner.
- (2) Fences around construction supplies or debris shall be maintained.
- (3) Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.
- (4) During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warning signs to prevent entry.
- (5) Workers shall be required to wear photo identification badges at all times for identification and security purposes while working at occupied sites.
- (f) Separation of construction areas from occupied spaces.

Construction areas which are under the control of a contractor and therefore not occupied by district staff or students shall be separated from occupied areas. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the containment barriers must be made to prevent exposure to dust or contaminants. Gypsum board must be used in exit ways or other areas that require fire rated separation. Heavy duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.

- (1) A specific stairwell and/or elevator should be assigned for construction worker use during work hours. In general, workers may not use corridors, stairs or elevators designated for students or school staff.
- (2) Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.
- (3) All occupied parts of the building affected by renovation activity shall be cleaned at the close of each workday. School buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session.
- (g) Maintaining exiting and ventilation during school construction projects.

The following information shall be included in all plans and specifications for school building projects:

(1) A plan detailing how exiting required by the applicable building code will be maintained during construction. The plan shall indicate temporary construction required to isolate construction equipment, materials, people, dust, fumes, odors, and noise during the construction period. Temporary construction details shall meet code-required fire ratings for separation and corridor enclosure. At a minimum, required exits, temporary stairs, ramps, exit signs, and door hardware shall be provided at all times.

A plan detailing how adequate ventilation will be maintained during construction. The plan shall indicate ductwork which must be rerouted, disconnected, or capped in order to prevent contaminants from the construction area from entering the occupied areas of the building. The plan shall also indicate how required ventilation to occupied spaces affected by construction will be maintained during the project.

(h) Fire and hazard prevention.

Areas of buildings under construction that are to remain occupied shall maintain a certificate of occupancy. In addition, the following shall be strictly enforced:

- (1) No smoking is allowed on public school property, including construction areas.
- (2) During construction daily inspections of district occupied areas shall be conducted by school district personnel to assure that construction materials, equipment or debris not block fire exits or emergency egress windows.
- (3) Proper operation of fire extinguishers, fire alarm, and smoke/fire detection systems shall be maintained throughout the project.
- (i) Noise abatement during construction and maintenance activities.

Construction and maintenance operations shall not produce noise in excess of 60 dba in occupied spaces or shall be scheduled for times when the building or affected building spaces are not occupied or acoustical abatement measures shall be taken. Noise level measurements (dba) shall be taken with a type 2 sound level meter in the occupied space in a location closest to the source

of the noise. Complaints regarding excessive noise shall be addressed through the health and safety committee. The district should anticipate those times when construction noise is unacceptable and incorporate "no work" periods into the bid specifications.

(j) Control of chemical fumes, gases, and other contaminants during construction and maintenance projects.

The bid specifications and construction contracts for each construction project shall indicate how and where welding, gasoline engine, roofing, paving, painting or other fumes will be exhausted. Care must be taken to assure fresh air intakes do not draw in such fumes.

- (1) The bid specifications shall require schedules of work on construction and maintenance projects which include time for off-gassing of volatile organic compounds introduced during construction before occupancy is allowed. Specific attention is warranted for activities including glues, paint, furniture, carpeting, wall coverings, and drapery. Manufacturers shall be contacted to obtain information regarding appropriate temperatures and times needed to cure or ventilate the product during use and before safe occupancy of a space can be assured. Building materials or furnishings which off-gas chemical fumes, gases, or other contaminants shall be aired out in a well ventilated heated warehouse before it is brought to the project for installation or the manufacturer's recommended off-gassing periods must be scheduled between installation and use of the space. If the work will generate toxic gases that cannot be contained in an isolated area, the work must be done when school classes and programs are not in session. The building must be properly ventilated and the material must be given proper time to cure or off-gas before re-occupancy.
- (2) Manufacturer's material safety data sheets (MSD) shall be maintained at the site for all products used in the project. MSDS must be provided to anyone who requests them. MSDS indicate chemicals used in the product, product toxicity, typical side effects of exposure to the product and safe procedures for use of the product.
- (k) Asbestos abatement protocols.

All asbestos abatement projects shall comply with all applicable Federal and State laws including but not limited to the New York State Department of Labor industrial code rule 56 (12 NYCRR 56), and the Federal Asbestos Hazard Emergency Response Act (AHERA), 40 CFR part 763 (Code of Federal Regulations, 1998 Edition, Superintendent of Public Documents, U.S. Government Printing Office, Washington, DC 20402; 1998; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234). Large and small asbestos projects as defined by 12 NYCRR 56 shall not be performed while the building is occupied. Minor asbestos projects defined by 12 NYCRR 56 as an asbestos project involving the removal, disturbance, repair, encapsulation, enclosure or handling of 10 square feet or less of asbestos or asbestos material, or 25 linear feet or less of asbestos or asbestos material may be performed in unoccupied areas of an occupied building in accordance with the above referenced regulations.

(I) Lead paint.

Any construction or maintenance operations which will disturb lead based paint will require abatement of those areas pursuant to protocols detailed in the "Guidelines for the Evaluation and

Control of Lead-Based Paint Hazards in Housing" (June 1995; U.S. Department of Housing and Urban Development, Washington, D.C. 20410; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234). All areas scheduled for construction as well as areas of flaking and peeling paint shall be tested for the presence of lead and abated or encapsulated in accordance with the above noted guidelines.

(m) Radon.

Districts shall take responsibility to be aware of the geological potential for high levels of radon and to test and mitigate as appropriate. This information is available from the New York State Department of Health Radon Measurement Database.

(n) Post construction inspection.

The school district or board of cooperative educational services shall provide the opportunity for a walk-through inspection by the health and safety committee members to confirm that the area is ready to be reopened for use.

8 CRR-NY 155.5

Current through April 15, 2021

Primary Source:

https://govt.westlaw.com/nycrr/Document/I3662bca9c22211ddb29d8bee567fca9f?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)

From https://dos.ny.gov/state-register, click State Register's New York Codes, Rules and Regulations "Search" button:

https://govt.westlaw.com/nycrr/index? IrTS=20190327201930309&transitionType=Default&contextData=%28sc.Default%29

22 September 2023 44-90-00-00-8-035-008 Bid Issue Orange-Ulster BOCES
Interior Alterations – Third Floor
Regional Education Center at Arden Hill

SECTION 004100 - PROPOSAL FORM

Project: Interior Alterations at the Regional Education Center at Arden Hill

Project Location: Regional Education Center at Arden Hill

Terrence L Olivo Building (Main Building)
4 Harriman Drive Goshen, New York 10924

Owner: Orange-Ulster BOCES

53 Gibson Road

Goshen, New York 10924

Bid Proposals: Mark Coleman, Asst. Supt for Finance & Mgmt.

Contact: Orange-Ulster BOCES

53 Gibson Road Goshen, NY 10924 845.291.0160

Architect: KG+D Architects, PC

285 Main Street

Mount Kisco, NY 10549

914.666.5900

The Undersigned, in compliance with the Invitation and Instructions to Bidders, agrees that if this bid is accepted as hereinafter provided he/she will sign the Project Labor Agreement and he/she will provide all labor, materials, supplies, tools, plant and equipment necessary to perform all work required for the construction of the aforementioned project in accordance with documents as prepared by KG+D Architects, P.C.; 285 Main Street; Mount Kisco, NY.; Telephone: 1-914-666-5900 for the class of work at the aforementioned project as listed below:

Contract #1 – General Construction
For the following LUMP SUM COST as applicable to the particular contract:

- u	//
Dolla	ars (\$

Further, as part of the proposal, the undersigned:

- Each bidder shall submit with its bid a separate sealed list that names each subcontractor that the Bidder will use to perform work on the contract, and the agreed-upon amount to be paid to each, for: (a) plumbing, (b) heating, ventilating and air conditioning apparatus and (c) electric wiring, equipment, and standard illuminating fixtures.
- Agrees to the stated percentages for extra work if ordered on a Time and Material basis in accordance with Article 13 of the Contract to cover all overhead and profit allowance.
- Takes notice of the time constraints set forth in Section 011000 and agrees to the terms of the Contract.
- Agrees to enter into, become signatory to, and to abide by, the provisions of the Project Labor Agreement.
- Agrees to require any and all of its subcontractors of any tier on this Project to become signatory to, and to abide by, the Project Labor Agreement.

Agrees to participate in apprentice training programs in the trades of work it employs and
agrees to require any contractor and subcontractor of any tier performing work on the
Project to participate in apprentice training programs in the trades of work it employs.
Each such apprentice training programs must have at least one apprentice currently
enrolled in the program and must have been approved by the New York State Department
of Labor for not less than three (3) years.

It is understood that the Owner reserves the right to accept or reject any and all bids that the Owner deems to be in his best interest.

Upon notification of acceptance of this proposal, the undersigned agrees to execute a contract in the form as stated within these contract documents for the amount stated and to execute the PLA.

Prices quoted shall be guaranteed for forty-five (45) days after date of proposal.

If written Notice to Proceed, Letter of Intent or Contract is received within forty-five (45) calendar days after the opening of bids, the undersigned agrees to execute said contract and furnish to the Owner within ten (10) days after receipt of said notice of award, the executed Contract, together with the Performance Bond, Labor and Material Payment Bonds and Insurance Certificates required herein.

The Undersigned agrees that the Bid Security payable to Owner accompanying this proposal is left in escrow with the Owner; that its' amount is the measure of liquidated damages which the Owner will sustain by the failure of the Undersigned to execute and deliver the above named Bonds, Contract and PLA; and that if the undersigned defaults in furnishing said bonds or in executing and delivering said Contract and PLA within ten (10) days of written notification of award of the Contract to him/her, then said Security shall be payable to the Owner for its' own account; but if this proposal is not accepted within said forty five (45) days of the time set for submission of Bids, or if the Undersigned executes and delivers said bonds, Contract, and PLA, the Bid Security shall be returned to the Undersigned.

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

Addendum	Date	Acknowledgment	

By submission of this Proposal, the undersigned acknowledges that they have read the milestone and schedule requirements, Section 011000, and agrees to provide sufficient staff and organization as well as to select subcontractors, suppliers and vendors to comply with the requirements for submittals, delivery dates, work periods and completion dates as specified.

The Undersigned hereby certifies that they are able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work.

Authorized Signature:		
•	(Print Name)	(Signature)

NON-COLLUSIVE AFFIDAVIT

Every bid or proposal made to a political subdivision of the State or any public department, agency or official thereof or to a fire district or any agency or official thereof, for work or services performed or to be performed or goods sold to 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 and is made pursuant to Section 103d of the General Municipal Law of the State of New York as amended by Laws of 1966.

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

By submission of this Proposal

each bidder and each person signing on behalf of any bidder certifies, and in the case of a
joint bid each party thereto certifies as to its own organization, under penalty of perjury, that
to the best of its knowledge and belief that each bidder is not on the list created pursuant to
paragraph (b) of subdivision 3 of Section 165-a of the state finance law."

(NON-COLLUISIVE AFFIDAVIT CONTINUES NEXT PAGE)

004100 - 3 PROPOSAL FORM

22 September 2023 44-90-00-00-8-035-008 Bid Issue Orange-Ulster BOCES Interior Alterations – Third Floor Regional Education Center at Arden Hill

• the Undersigned acknowledges that they have visited the site, informed themselves of the existing conditions, and have included in the Proposal a sum to cover the costs of all items in the contracts.

Respectfully submitted,	
Contractor signature	
Ву	Title
Business Name:	
Address:	
Telephone Number:	
Attest:	Title

SEAL IF CORPORATION

004100 - 4

22 September 2023 44-90-00-00-8-035-008 Bid Issue Orange-Ulster BOCES Interior Alterations – Third Floor Regional Education Center at Arden Hill

INDEMNIFICATION AND HOLD HARMLESS CLAUSE

Contractor Agrees to indemnify and save harmless the Owner, and any of their agents, assigns, employees or independent contractors, the Architect and persons in his employ, from any and all liability for damages for injury to the person or property of another and from all suits and actions and all costs and damages to which such parties may be subjected resulting from the Contractor's performance of this contract, whether such performance be by the Contractor, or by any Subcontractor or employee.

I certify that I have been duly authorized to execute this Agreement on behalf of:				
	(Name	of Contractor)		
Dated:	Signed _			
	_	(Print Name)		
	_	(Title)		

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.

			, bein	g duly sworn, der	leposes and says	
he/she	is	the			of the	
			Corporation and the component of the	nat neither the Bio	dder/ Contractor	
proposed su	bcontrac	tor is ident	ified on the Prohibited	Entities List.		
					SIGNED	
N to before m	e this		day of	,2023		
Public:						
	proposed su	proposed subcontrac	r proposed subcontractor is ident ——— N to before me this	he/she is the Corporation and the proposed subcontractor is identified on the Prohibited	Corporation and that neither the Big proposed subcontractor is identified on the Prohibited Entities List. N to before me this day of,2023	

OR

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

Bidders shall complete this form if they cannot certify that the bidder /contractor or any proposed

subcontractor is not identified on the Prohibited Entities List. The District reserves the right to undertake any investigation into the information provided herein or to request additional information from the bidder. Name of the Bidder: Address of Bidder _____ Has bidder been involved in investment activities in Iran? Describe the type of activities including but not limited to the amounts and the nature of the investments (e.g., banking, energy, real estate): _____ If so, when did the first investment activity occur? Have the investment activities ended? _____ If so, what was the date of the last investment activity? _____ If not, have the investment activities increased or expanded since April 12, 2012? Has the bidder adopted, publicized, or implemented a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran? If so, provide the date of the adoption of the plan by the bidder and proof of the adopted resolution, if any and a copy of the formal plan. In detail, state the reasons why the bidder cannot provide the Certification of Compliance with the Iran Divestment Act below (additional pages may be attached): I, _____ being duly sworn, deposes and says that he/she is the _____ of the _____ Corporation and the foregoing is true and accurate. SIGNED SWORN to before me this ______ day of ______, 2023

Notary Public: _____

22 September 2023 44-90-00-00-8-035-008 Bid Issue Orange-Ulster BOCES Interior Alterations – Third Floor Regional Education Center at Arden Hill

SEXUAL HARASSMENT WRITTEN POLICY & TRAINING CERTIFICATION (To be Completed by Each Bidder)

l ,	, being duly sworn, deposes and says that I
am (Name of Individual Signing this Ce	rtification)
the of	the
(Title/Position of Signer)	(Name of Bidder)
3 ,	,
case of a joint bid each party thereto coperjury, that the above-named bidder has sexual harassment prevention in the w	ify on behalf of the above-named bidder, and in the ertifies as to its own organization, under penalty of as and has implemented a written policy addressing vorkplace and provides annual sexual harassment. Such policy, at a minimum, meets the requirements abor Law.
	<u>Signature</u>
Sworn to before me thisday of, 2023	
Notary Public	

END OF PROPOSAL FORM

Bid Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)
Orange Ulster BOCES
53 Gibson Road
Goshen, NY 10924

BOND AMOUNT: \$

PROJECT:

(Name, location or address, and Project number, if any)
Interior Alterations – Third Floor
Regional Education Center at Arden Hill
4 Harriman Drive
Goshen, NY 10924
SED # 44-90-00-00-8-035-008

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

ADDITIONS AND DELETIONS:

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

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

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable. furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond. Signed and sealed this day of ,

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

SECTION 004513 - BIDDER QUALIFICATION STATEMENT

After receipt of bids and upon notification from the Architect, the bidder shall answer all questions set forth in the form within the time required in Article 1.07 of the Invitation and Instructions to Bidders. Failure to answer these questions in full may be cause for rejection of the bidder's proposal. If more space is required, please attach additional sheets.

 How many years has your organization been in business under your present name? 							
2.	How many years' experience in construction work of a similar type has your organizatio had?						
3.	List below the construction projects your organization has under way as of this date:						
Сог	ntract Sum	Class of Work/%Complete	Name/Address of Owner	Name & Phone # of Contact at Owner			
4.			projects which your firm, as a will qualify you for this work.	a firm, has performed in the			
Cor	ntract Sum	Class of Work/%Complete	Name/Address of Owner	Name & Phone # of Contact at Owner			
5.	or a Sub-co	ntractor. If your firm	ove, indicate whether your firm was a Sub-contractor, provid act phone number of the com	de the company name and			
Naı	me/Address of	Owner	Name & Phone # of Contac	t at Owner			
6.	•	een a party to a Proje ; If Yes, how many?	ct Labor Agreement? Where and when?				

7.	Have you ever failed to complete any work awarded to you? Yes No; If Yes, where and why? Has any officer or partner of your organization ever been an officer or partner of some other organization that failed to complete a construction contract? Yes No; If Yes, state:							
8.								
Nam	e of Individual(s)	Name of Owner(s)	Reason(s)					
9.	Has any officer contract handled ☐ Yes ☐ No; If ye	in his own name	ur organization ever failed to complete a construction?					
Nam	e of Individual(s)	Name of Owner(s)	Reason(s)					
10.	Has your firm or or ever been defa or ever been defa or Yes □ No; If ye e of Individual(s)	aulted or terminat	r received a Notice of Default or Notice of Termination ted on a Project. Reason(s)					
		- CWIICI(3)						
inform		y the Owner or A	requests any firm, person or corporation to furnish any Architect in verification of the matters contained in the					
Dated	l	, 20						
	(Name of Bidder))						
			By					
			Title					

AFFIDAVIT								
STATE OF)	0.0						
COUNTY OF)	S.S.						
of	being	duly	sworn	and	says	that	he/she	is
01 _			nization)					
and that the answers to the forego true and correct.	ing interro	ogatorie	es and all	staten	nents th	erein c	contained	are
Subscribed and sworn to before me								
this day of	2	0						
					Si	gnature	9	
Notary Public, County of								

End of Section

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

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

BETWEEN the Owner:

(Name, legal status, address, and other information)

Orange Ulster BOCES 53 Gibson Road Goshen, New York 10924

and the Contractor:

(Name, legal status, address, and other information)

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

Orange Ulster BOCES 2022 Bond Projects – Phase 1 Interior Alterations - Third Floor Regional Education Center at Arden Hill 4 Harriman Drive Goshen, New York 10924 SED # 44-90-00-00-8-035-008

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

The Palombo Group 22 Noxon Street Poughkeepsie, New York 12601

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

KG+D Architects, P.C. 285 Main Street Mount Kisco, New York 10549

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:

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

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

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

TABLE OF ARTICLES

- THE CONTRACT DOCUMENTS
- THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION
- **CONTRACT SUM**
- 5 **PAYMENTS**
- **DISPUTE RESOLUTION** 6
- **TERMINATION OR SUSPENSION** 7
- 8 MISCELLANEOUS PROVISIONS
- **ENUMERATION OF CONTRACT DOCUMENTS**

(Paragraphs deleted)

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, the Bidding Documents, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than Modifications, appears in Article 9. The Contractor represents that it has fully reviewed the Contract Documents and agrees that the Contract Documents describe, to the best of the Contractor's knowledge, the Work necessary to furnish and provide (and that the Contractor shall furnish and provide) a fully functioning Project consistent with the Contract Documents.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, or reasonably inferable by the Contractor as necessary to produce the results intended by the Contract Documents, for the Work, except as specifically indicated in the Contract Documents to be the responsibility of others. It is the intent of the parties to include within the Work any and all labor, materials, equipment and services that, although not expressly indicated in the Contract Documents, are reasonably inferable therefrom to construct complete and workable systems for the satisfactory performance, execution, final completion and use of the Work and Project.

ARTICLE 3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

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

[X]	The date of this Agreement.
[]	A date set forth in a notice to proceed issued by the Owner.
[]	Established as follows: (Insert a date or a means to determine the date of commencement of the Work.)

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

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

§ 3.3 Substantial Completion of the Project or Portions Thereof

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

(Insert the date of Substantial Completion of the Work of all Contractors for the Project.)

As per Project Schedule provided in the Contract Documents.

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

Portion of Work

Substantial Completion Date

As per Project Schedule provided in the **Contract Documents**

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

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

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

- Not later than () calendar days from the date of commencement of the Work.
- [X] By the following date: as per Project Schedule provided in the Contract Documents.
- § 3.4.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work of this Contract are to be substantially complete prior to when the entire Work of this Contract shall be substantially complete, the Contractor shall substantially complete such portions by the following dates:

Portion of Work

Date to be substantially complete

As per Project Schedule provided in the Contract Documents

- § 3.4.3 Time is of the essence in the performance of the Contract Documents, including, without limitation, the Substantial Completion dates established herein. The Contractor shall proceed expeditiously with adequate forces and shall use its best efforts to keep its Work and the Project on schedule, and the Contractor shall achieve the completion times established within the Contract Documents. Milestone dates set forth in the Project Schedule are dates critical to the Owner's operations that establish when the Work or a part thereof is to commence and be complete. All milestone dates are of the essence.
- § 3.4.4 If the Contractor fails to substantially complete the Work of this Contract, or portions thereof, as provided in this Section 3.4, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 **CONTRACT SUM**

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

[X] Stipulated Sum, in accordance with Section 4.2 below

- [] Cost of the Work plus the Contractor's Fee, in accordance with Section 4.3 below
- [] Cost of the Work plus the Contractor's Fee with a Guaranteed Maximum Price, in accordance with Section 4.4 below

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

User Notes:

(1685599059)

§ 4.2 Stipulated Sum

- § 4.2.1 The Contract Sum shall be (\$), subject to additions and deductions as provided in the Contract Documents.
- § 4.2.1.1 The Stipulated Sum shall not be adjusted for increased labor or material costs, whether foreseen or unforeseen, which may occur between the date of this Agreement and the Commencement Date, or which may occur between the Commencement Date and the Substantial Completion Date or Dates set forth in this Agreement.

§ 4.2.2 Alternates

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

Price Item

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

Item **Price Conditions for Acceptance**

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

> Item **Price**

§ 4.2.4 Unit prices, if any:

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

Units and Limitations Price per Unit (\$0.00) Item

§ 4.3 Liquidated damages, if any:

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

§ 4.3.1 The Contractor recognizes that achieving Substantial Completion of the Work in accordance with the time limits set forth in this Agreement and as further set forth in the Project Manual and/or Bidding Documents is a material condition of this Agreement, and that if the Contractor fails to achieve Substantial Completion of the Work, or designated parts thereof, in accordance with such schedule, the Owner will incur damages as a result. The Owner and Contractor agree that the amount of such damages is difficult to ascertain with any precision. The Owner and Contractor have attempted to estimate reasonable daily figures for liquidated damages, not to penalize the Contractor for late completion, but to reasonably estimate probable losses and damages to the Owner in the event of the late completion. Liquidated damages as used and defined in Section 8.4 of the AIA Document A232TM-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified for this Project.

§ 4.3.2 The

(Paragraphs deleted)

Contractor acknowledges that the liquidated damages amounts set forth above represent a fair and reasonable estimate of the Owner's probable losses, damages and/or expenses, and are not a penalty, for late completion of the Work and the phases thereof.

- § 4.3.3 The Owner shall be entitled to offset any liquidated damages owed by Contractor against any amounts owing by the Owner to the Contractor.
- § 4.3.4 The Owner's right to liquidated damages shall survive abandonment of the Work by the Contractor and the Owner's termination of the Contract.

Init.

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(Paragraphs deleted) (Table deleted) (Paragraphs deleted)

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

- § 5.1.1 Based upon Applications for Payment submitted to the Construction Manager by the Contractor, and Certificates for Payment issued by the Construction Manager and Architect, the Owner shall make progress payments on account of the Contract Sum, to the Contractor, as provided below and elsewhere in the Contract Documents.
- § 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month.
- § 5.1.3 Provided that an Application for Payment is received by the Construction Manager not later than the 7th day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the 7th day of the subsequent month. If an Application for Payment is received by the Construction Manager after the application date fixed above, payment of the amount certified shall be made by the Owner not later than forty-five (45) days after the Construction Manager receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

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

- § 5.1.4.1 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.
- § 5.1.4.2 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment. 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.
- § 5.1.4.3 In accordance with AIA Document A232TM—2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified for this Project (hereinafter, "AIA Document A232-2019"), and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:
- § 5.1.4.3.1 The amount of each progress payment shall first include:
 - That portion of the Contract Sum properly allocable to completed Work; .1
 - .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
 - .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.
- § 5.1.4.3.2 The amount of each progress payment shall then be reduced by:
 - The aggregate of any amounts previously paid by the Owner; .1
 - .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;

- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect, Construction Manager or Owner may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019;
- .5 Retainage withheld pursuant to Section 5.1.7; and
- Subtract one hundred fifty percent (150%) of the amount of any lien(s) on public improvement filed against .6 the Contract Sum that has not been released or discharged.

§ 5.1.5 – Intentionally omitted.

(Paragraphs deleted)

§ 5.1.6 – Intentionally omitted.

(Paragraphs deleted)

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to when the Work of this Contract is substantially complete, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

Five percent (5%)

§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

None

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

(If the retainage established in Section 5.1.7.1 is to be modified prior to when the entire Work of this Contract is substantially complete, including modifications for completion of portions of the Work as provided in Section 3.4.2, insert provisions for such modifications.)

No retainage reduction prior to Substantial Completion of the entire Work.

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, when the Work of this Contract is substantially complete, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted when the Work of this Contract is substantially complete shall not include retainage as follows:

(Insert any other conditions for release of retainage when the Work of this Contract is substantially complete, or upon Substantial Completion of the Work of all Contractors on the Project or portions thereof.)

Upon Substantial Completion of the Work, the payment shall be less two times the value of any remaining Work to be completed as the Construction Manager recommends and the Architect determines for incomplete Work and an amount necessary to satisfy any claims, liens or judgments against the Contractor that have not been suitably discharged.

§ 5.2 Final Payment

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

- § 5.2.1.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when
 - the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work .1 as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment;
 - .2 the Contractor has submitted all Closeout documents and complied with the final payment and all closeout requirements of the Contract Documents; and
 - .3 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect.

- § 5.2.1.2 In addition to other required items, including but not limited to those required under Section 9.10 of the General Conditions, the final Application for Payment must be accompanied by the following, all in form and substance satisfactory to the Owner and in compliance with applicable law:
 - .1 permanent certificate(s) of occupancy or use issued by the appropriate governmental authority;
 - .2 all maintenance and operating manuals;
 - .3 marked sets of field drawings and specifications reflecting "as-built" conditions;
 - reproducible Mylar drawings reflecting the location of any concealed utilities, mechanical and electrical systems, and their components;
 - assignments of all guarantees and warranties to the Contractor from Subcontractors, materialmen, vendors, or manufacturers, together with a list of their names, addresses, telephone numbers, and corresponding guarantees and warranties from each; and
 - all other information and materials required to comply with the requirements of the Contract Documents or reasonably requested by the Owner, Architect, or Construction Manager.

(Paragraphs deleted)

- § 5.2.1.3 The Owner's final payment to the Contractor, less any sum required by law to be held due to a lien(s) on public improvement filed against the Contract Sum that has not been released or discharged, shall be made no later than 30 days after the issuance of the final Certificate for Payment or Project Certificate for Payment. After final payment, payment of any sums withheld due to a lien against a public improvement filed with the Owner against the Contract Sum will be made to the Contractor when the lien is discharged.
- § 5.3 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located. (Insert rate of interest agreed upon, if any.)

In accordance with Section 106-b(1)(b) of the New York State General Municipal Law.

DISPUTE RESOLUTION ARTICLE 6

§ 6.1 Initial Decision Maker

The Architect will serve as Initial Decision Maker pursuant to Article 15 of AIA Document A232–2019, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker. (Paragraphs deleted)

§ 6.2 Binding Dispute Resolution

For any Claim or dispute arising out of this Agreement, the method of binding dispute resolution shall be as follows: (Check the appropriate box.)

[]	Arbitration pursuant to	Article 15 of AIA Document A232–2019.
	-	1	

Litigation in a court of competent jurisdiction in the County of Orange in the State of New York.

[]	Other:	(Specify)
1	1-1-4-1	

(Paragraphs deleted)

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 Where the Contract Sum is a Stipulated Sum

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

(Paragraphs deleted)

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

(Paragraphs deleted)

ARTICLE 8 MISCELLANEOUS PROVISIONS

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

§ 8.2 The Owner's representative:

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

Mark Coleman Assistant Superintendent for Finance and Management Services Orange Ulster BOCES 53 Gibson Road Goshen, NY 10924

§ 8.3 The Contractor's representative:

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

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

§ 8.5 Insurance and Bonds

- § 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in Article 11 of AIA Document A232-2019, and elsewhere in the Contract Documents.
- § 8.5.2 The Contractor shall provide bonds as set forth in Article 11 of AIA Document A232–2019, and elsewhere in the Contract Documents.
- § 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A232–2019, may be given in accordance with AIA Document E203TM—2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

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

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

§ 8.7 Intentionally omitted.

§ 8.8 Other provisions:

- § 8.8.1 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:
 - 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;
 - that it is authorized to do business in the State of New York and the United States and properly licensed by all necessary governmental and public and quasi-public authorities having jurisdiction over it and over the Work and the Project;
 - .4 that its execution of this Agreement and its performance thereof is within its duly authorized powers;

- .5 that its duly authorized representative has visited the site of the Project, is familiar with the local and special conditions under which the Work is to be performed and has correlated on-site observations with the requirements of the Contact Documents; and
- that it possesses a high level of experience and expertise in the business administration, construction, construction management and superintendence or 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 Section 8.8.1, 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.

Upon the execution of this Contract, the Contractor shall, upon request, provide the Owner with unredacted 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 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A132TM–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition
- .2 Bidding Documents
- .3 AIA Document A232TM–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified
- .4 AIA Document E203TM_2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:

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

N/A

.5 Drawings

Refer to the attached **Exhibit B**, **List of Drawings**, all of which drawings listed therein are incorporated herein by reference.

(Table deleted)

.6 Specifications

(Table deleted)

.8

User Notes:

Init.

Refer to the attached **Exhibit C**, **Specifications Table of Contents**, all of which sections listed therein are incorporated herein by reference.

Pages

.7 Addenda, if any:

Number

[]

	ns of Addenda relating to bidding or proposal requirements are not part of the Contract Documents the bidding or proposal requirements are also enumerated in this Article 9.
Oth	Exhibits: N/A k all boxes that apply and include appropriate information identifying the exhibit where required.)
[]	AIA Document A132 TM –2019, Exhibit B, Determination of the Cost of the Work

AIA Document E235TM–2019, Sustainable Projects Exhibit, Construction Manager as Adviser

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Edition, dated as indicated below:

Date

	[]	The Sustainability Plan:			
	Title		Date	Pages	
	[]	Supplementary and other Co.	nditions of the Con	tract:	
	Docu	ument	Title	Date	Pages
	(List he Docume forms, t requirer are not be listed Exhibit Exhibit Exhibit of PRO ector agrees son Valle	ocuments, if any, listed below: re any additional documents the ent A232–2019 provides that the Contractor's bid or proposements, and other information fit part of the Contract Document of there only if intended to be part of Drawings A – Contractor's Bid Form B – List of Drawings C – Specifications Table of Contractor Table of Contractor Security and Construction Tached hereto.	hat are intended to he advertisement or al, portions of Adde furnished by the Own its unless enumerate art of the Contract I ontents NT Typy to, and to abide be	invitation to bid, Instruction in the relating to bidding or preserved in anticipation of received in this Agreement. Any surpose Documents.)	ns to Bidders, sample proposal ing bids or proposals, uch documents should in ject Labor Agreement
		shall require any and all of its side by, the Project Labor Agre		ny tier performing work for	Project to become
		and any subcontractor perform of work it employs.	ing work on the Pro	oject shall participate in app	prentice training
		rentice training programs musted by the New York State Dep			
		e Project shall be subject to the et shall be subject to the review			sign and construction
This Agreem	ent is ente	ered into as of the day and year	r first written above	2.	
OWNER (Sig	gnature)		CONTRA	ACTOR (Signature)	
(Printed nat	ne and tit	le)	(Printed	l name and title)	

SECTION 006100 - BOND REQUIREMENTS

SEE ATTACHMENT TO SECTION FOR ACCEPTABLE BONDING COMPANY RATINGS

- 1.1 Prior to the Owner signing the contract agreement, he will require the Contractor (s) to furnish <u>separate</u> performance and labor and material payment bonds covering the faithful performance of the entire construction contract agreement.
 - The performance bond and the labor and material payment bond shall each be made out in one hundred percent (100%) of the guaranteed maximum contract amount.
- 1.2 The "Performance Bond" and "Labor and Material Payment Bond", A.I.A. Document A-312, as published by The American Institute of Architects shall be used and modified, if necessary, to comply with applicable statutes.
 - NOTE: Date of forms to be used shall be complementary to the date of the contract form and general conditions incorporated within these Bidding and Contract Requirements.
- 1.3 The bonds shall be signed by an official of the bonding company and shall be accompanied by the bonding agent's written power of attorney.
- 1.4 Provide four (4) copies each of the bonds and the power of attorney in order that one (1) copy of each may be attached to each copy of the contract agreement.
- 1.5 The Contractor (s) shall include in his/their proposal(s) amount the total premiums for the performance and labor and material payment bonds.

End of Section

Attachment To Section 006100 - Bonding Requirements

Acceptable Bonding Company Ratings

Contract Amounts (\$)	A.M. Best Company Rating							
Contract Amounts (\$)	A + XII	B + XI	B + X	ВХ	BIX	B VIII	B VII	B VI
10 Million and Over								
7.5 to 10 Million								
5.0 to 7.5 Million								
2.5 to 5.0 Million			A	A				
1.0 to 2.5 Million								
0.5 to 1.0 Million								
0.25 to 0.5 Million	A		A	A	A	A		
0.25 and Under				A		A		A

Performance Bond

CONTRA	ACTOR:		
(Name,	legal status	and	address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address) Orange Ulster BOCES 53 Gibson Road Goshen, NY 10924

CONSTRUCTION CONTRACT

Date:

Amount: \$ 0.00 Description: (Name and location) Interior Alterations - Third Floor Regional Education Center at Arden Hill 4 Harriman Drive Goshen, NY 10924 SED # 44-90-00-00-8-035-008

Date:

(Not earlier than Construction Contract Date)

Modifications to this Bond: None

CONTRACTOR AS PRINCIPAL SURETY

(Corporate Seal) Company: (Corporate Seal) Company:

Signature: Signature:

Name and Name and

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

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER**:

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

See Section 16

ADDITIONS AND DELETIONS:

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

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

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

- § 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner 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
 - 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
 - .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety;
 - .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:
 - 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
 - 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 adda CONTRACTOR AS PRINCIPAL	itional signatures of add	ded parties, other than those of SURETY	appearing on the cover page
Company:	(Corporate Seal)	Company:	(Corporate Seal)
Signature:		Signature:	
Name and Title: Address:		Name and Title: Address:	

Payment Bond

CONTRACTOR:	SURETY:
OWNER: (Name, legal status and address) Orange Ulster BOCES 53 Gibson Road	(Name, legal status and principal place of business)
Goshen, NY 10924	
CONSTRUCTION CONTRACT Date:	
Amount: \$ 0.00	
Description:	
(Name and location)	
Interior Alterations – Third Floor	***
Regional Education Center at Arden H 4 Harriman Drive	111
Goshen, NY 10924	
SED # 44-90-00-00-8-035-008	
BOND	
Date: (Not earlier than Construction Contraction Contraction)	et Data)
(Not earlier than Construction Contract	it Duie)
Amount: \$	
Modifications to this Bond:	None See Section 18
CONTRACTOR AS PRINCIPAL	SURETY
Company: (Corporate Seal)	Company: (Corporate Seal)
(supremy)	
Signature:	Signature:
Name and	Name and
Title:	Title:
(Any additional signatures appear on t	he last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

ADDITIONS AND DELETIONS:

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

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

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

OWNER'S REPRESENTATIVE: (Architect, Engineer or other party:)

User Notes:

- § 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,
 - 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
 - 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;
 - 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
 - .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 add	litional signatures of add	-	appearing on the cover page.,
CONTRACTOR AS PRINCIPAL		SURETY	
Company:	(Corporate Seal)	Company:	(Corporate Seal)
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		Address:	

User Notes:



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

for the following PROJECT:

(Name, and location or address)

Orange Ulster BOCES 2022 Bond Projects - Phase 1 Interior Alterations – Third Floor Regional Education Center at Arden Hill 4 Harriman Drive Goshen, New York 10924 SED # 44-90-00-00-8-035-008

THE CONSTRUCTION MANAGER:

(Name, legal status, and address)

The Palombo Group 22 Noxon Street Poughkeepsie, New York 12601

THE OWNER:

(Name, legal status, and address)

Orange Ulster BOCES 53 Gibson Road Goshen, New York 10924

THE ARCHITECT:

(Name, legal status, and address)

KG+D Architects, PC 285 Main Street Mount Kisco, NY 10549

ADDITIONS AND DELETIONS:

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

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

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

User Notes:

(1882732331)

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- 3 CONTRACTOR
- 4 ARCHITECT AND CONSTRUCTION MANAGER
- 5 SUBCONTRACTORS
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
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- 8 TIME
- 9 PAYMENTS AND COMPLETION
- 10 PROTECTION OF PERSONS AND PROPERTY
- 11 INSURANCE AND BONDS
- 12 UNCOVERING AND CORRECTION OF WORK
- 13 MISCELLANEOUS PROVISIONS
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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

- § 1.1.1 The Contract Documents. The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter, the "Agreement"), and consist of the Bidding Documents (including, but not limited to, Invitations to Bid, Instructions to Bidders, sample forms, the Contractor's bid or portions of the addenda relating to bidding requirements), the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect.
- § 1.1.2 The Contract. The Contract Documents form the Contract for Construction (hereinafter, the "Contract"). The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and the Construction Manager or the Construction Manager's consultants, (3) between the Owner and the Architect or the Architect's consultants, (4) between the Contractor and the Construction Manager or the Construction Manager's consultants, (5) between the Owner and a Subcontractor or Sub-subcontractor (6) between the Construction Manager and the Architect, or (7) between any persons or entities other than the Owner and Contractor. The Construction Manager and Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of their duties.
- § 1.1.2.1 Where the term "Agreement," "Contract" or "Prime Contract" is used in these General Conditions, and other Contract Documents, it shall mean the separate Owner-Contractor Agreement between the Owner and each Prime Contractor identified in Conditions of the Contract (General, Supplementary and other conditions).
- § 1.1.2.2 The Contractor acknowledges and warrants that it has closely examined all the Contract Documents, that they are suitable and sufficient to enable the Contractor to complete the Work in a timely manner for the Contract Sum, and that they include all work, whether or not shown or described, which reasonably may be inferred to be required or useful for the completion of the Work in full compliance with all applicable statutes, codes, laws, ordinances and regulations.
- § 1.1.3 The Work. The term "Work" means the construction and services required by the Contract Documents, or as reasonably inferable therefrom, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project. The Work includes all of the Contractor's responsibilities as to all labor, parts, supplies, equipment, skill, supervision, transportation services, storage requirements, and other facilities and things necessary, proper or incidental to the carrying out and completion of the terms of the Contract Documents and all other items of cost or value needed to produce, construct, and fully complete the Contractor's Work identified by the Contract Documents.
- § 1.1.4 The Project. The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by other Contractors, and by the Owner's own forces and Separate Contractors.
- § 1.1.5 Contractors. Contractors are persons or entities, other than the Contractor or Separate Contractors, who perform Work under contracts with the Owner that are administered by the Architect and Construction Manager.
- § 1.1.6 Separate Contractors. Separate Contractors are persons or entities who perform construction under separate contracts with the Owner not administered by the Architect and Construction Manager.
- § 1.1.7 The Drawings. The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

- § 1.1.8 The Specifications. The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services and general requirements for the Project.
- § 1.1.9 Instruments of Service. Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials including those in electronic form.
- § 1.1.10 Initial Decision Maker. The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.1.11 Miscellaneous Definitions

- § 1.1.11.1 The terms "knowledge," "recognize" and "discover," their respective derivatives and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows (or should know), recognizes (or should recognize) and discovers (or should discover) in exercising the care, skill, and diligence required by the Contract Documents. The expression "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a contractor familiar with the Project and exercising care, skill, and diligence required of the Contractor by the Contract Documents.
- § 1.1.11.2 The term "any" in the Contract Documents shall be interpreted as "any and all" whenever one or more than one item would be applicable for completion of the Work.
- § 1.1.11.3 Except as otherwise explicitly provided, the words "approved" or "approval" shall mean the written approval of the Architect or the Construction Manager, or both.
- § 1.1.11.4 "Accepted," "directed," "permitted," "requested," "required," and "selected" are used herein as term connections and unless specifically noted otherwise are to mean "accepted by the Architect," "directed by the Architect," "required by the Architect," "required by the Architect," and "selected by the Architect." However, no such implied meaning will be interpreted to extend the Architect's responsibility into the Contractor's areas of construction supervision.
- § 1.1.11.5 The term "as indicated" or "as shown" shall mean "as indicated in the Contract Documents."
- § 1.1.11.6 The term "include" in any form other than "inclusive" is non-limiting and not intended to mean "all inclusive."
- § 1.1.11.7 The terms "furnish" and "furnish all materials," unless specifically noted otherwise, mean "pay for, supply and deliver to the job site all new materials, systems, equipment, product, and/or other items so specified."
- § 1.1.11.8 The terms "install" and "furnish all labor," unless specifically noted otherwise, mean "pay for, perform all operations connected with installation of Work including unloading new product to be installed, supplying all necessary equipment and rigs to do the Work, test, place in operation and service, and remove all packing material."
- § 1.1.11.9 The term "product" includes materials, systems, equipment, and other items to be incorporated into the Work.
- § 1.1.11.10 The term "provide," unless specifically noted otherwise, means "furnish new, install, connect up, complete, test and place in operation and service."
- § 1.1.11.11 The term "replace" or similar term shall mean "restore," "renew," "make good," "reconstruct," or "as applicable using new product."
- § 1.1.11.12 The term "concealed" as used herein shall mean items hidden from sight in such locations as trenches, chases, shafts, furred spaces, walls, slabs, above ceilings and where in sight in crawl spaces or service tunnels.

- §1.1.11.13 The term "exposed" as used herein shall mean not "concealed" as defined herein and the spaces behind normally closed doors such as interiors of cabinets.
- § 1.1.11.14 The terms "manufacturer" or "supplier" mean any person or entity which contracts to furnish materials to a Contractor, Subcontractor, or any Sub-subcontractor for use at the site of the Project.
- § 1.1.11.15 "Wiring" shall be understood to mean wires or cables with conduit, fittings, boxes, etc., installed complete.
- § 1.1.11.16 "Piping" shall be understood to mean all pipes, fittings, nipples, valves and all accessories connected thereto.
- § 1.1.11.17 The Contract Time is the period of time specified in Article 3 of the Agreement for completion of the Work.
- § 1.1.11.18 "Project Manual" is a volume assembled for the Work that includes the Instructions to Bidders, General Conditions, Supplementary General Conditions, the Specifications, and all Addenda issued prior to execution of the Contract. The Project Manual will additionally include bidding requirements and documents and sample forms.
- § 1.1.11.19 Terms not otherwise defined herein shall have the meanings set forth elsewhere in the Contract Documents.

§ 1.2 Correlation and Intent of the Contract Documents

- § 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. It is intended that all plumbing, mechanical, electrical, and other systems will be complete and in proper operation, and that all construction components, whether part of such systems or otherwise, will be complete and in compliance with accepted construction practice upon completion of the Work. Even if items are missing from the Drawings or Specifications, but are normally required for proper operation of plumbing, mechanical, electrical, and other systems, or to complete otherwise incomplete construction, or to meet governing code requirements, they shall be included by the Contractor, unless he sought and received contradictory interpretation or clarification from the Architect.
- § 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.
- § 1.2.1.2 The Contractor and its Subcontractors shall evaluate and satisfy themselves as to the conditions and limitations under which the Work is to be performed, including without limitation (1) location, layout, and nature of the Project site and surrounding areas, (2) generally prevailing climatic conditions, (3) anticipated labor supply and costs, (4) availability and cost of materials, tools, equipment, (5) Owner occupancy requirements and constraints, (6) site safety logistics plan and any phased construction plan and (7) other similar issues. The Owner assumes no responsibility or liability for the physical condition or safety of the Project site or any improvements located on the Project site. The Contractor shall be solely responsible for providing a safe place for the performance of the Work. No adjustments will be made in either the Contract Sum or Contract Time for any failure by the Contractor or any Subcontractor to comply with the requirements of this Section 1.2.1.2.
- § 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. Instructions and other information furnished in the Specifications including, without limitation, items in connection with prefabricated or prefinished items, are not intended to supersede work agreements between employers and employees. Should the Specifications conflict with such work agreements, the work agreements shall be followed, provided such items are provided and finished as specified in the Contract Documents.

If necessary, such work shall be performed on the Project site, instead of at the shop, by appropriate labor and in accordance with the requirements of the Drawings and Specifications.

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

§ 1.2.4 In the event of inconsistencies within or between parts of the Contract Documents or between the Contract Documents and applicable standards, codes and ordinances, the Contractor shall (1) provide the better quality or greater quantity of work or (2) comply with the more stringent requirements; either or both in accordance with the Architect's interpretation. Where the Contractor perceives a conflict, it shall inform the Architect and Owner thereof and request a decision from the Architect, which shall be promptly communicated by the Architect to the Contractor so as not to cause any delay in the performance of the Work. Any Work performed after perceiving the conflict and prior to resolution by the Architect shall be at the Contractor's risk. The terms and provisions of this Section 1.2.4, however, shall not relieve the Contractor of any of the obligations set forth elsewhere herein.

- The Contractor shall not scale Drawings. Dimensions on large scale drawings take precedence over dimensions on small scale drawings. The Contractor shall notify the Architect if additional dimensions are needed. The Contractor shall field verify all dimensions.
- .2 Before ordering any materials or doing any work, the Contractor and each Subcontractor shall verify measurements at the Project Site and shall be responsible for the correctness of such measurements. The Contractor shall confirm all dimensions by field measuring. No extra charge or compensation will be allowed on account of differences between actual dimensions and the dimensions indicated on the Drawings. Any difference that may be found shall be submitted to the Architect for resolution before proceeding with the Work.
- .3 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.
- Certain portions of the Specifications are written in condensed outline form and omitted words are to be supplied by inference. Naming of an article or operations shall have the effect of stating "Contractor shall furnish, install and complete" said operation or article unless it is further qualified in the context in which it appears.
- .5 When reference is made to specifications of a manufacturer, trade association, governmental agency, reference standard or similar source (such as ASTM, ASA, AISC, ACI, etc.) such is made part of the Drawings and Specifications, having the force and effect as though reproduced therein, and upon entering into the Contract the Contractor acknowledges his familiarity with those pertaining to its Work. Furthermore, all Work mentioned or indicated in the Contract Documents shall be performed by the Contractor as part of the Contract unless it is specifically indicated in the Contract Documents that such work is to be done by others. All Work shall conform to the National Electric Code, New York State Uniform Fire Prevention and Building Code, and amendments thereto, New York State Energy Conservation Construction Code, State Education Department Manual of Planning Standards, New York State Department of Transportation, Office of Engineering, Standard Specification, Construction and Materials, latest edition, Life Safety Code - NFPA, and applicable City and State Building Codes and Authorities having jurisdiction. The date of the reference standard shall be the latest edition at the time of signing the Contract except as specifically indicated otherwise.
- The Contract Drawings are intended to show the general arrangement, design, and extent of the Work and are partly diagrammatic. They are not intended to be scaled for any purpose, or to serve as shop drawings. The Contractor and its Subcontractors will cooperate with all other contractors and their respective subcontractors in determining the construction of systems, running of pipe, and locating equipment. The Contractor agrees that the failure to repeat typical details, figures, or notes on all Contract Drawings or other Contract Documents will not be a basis for claims for additional cost or time.
- .7 Any necessary variations in routing or installation shall be made to conform to the intent of the Contract Documents without additional costs. Where there are intersections or obstructions involving ducts, piping, or any other equipment requiring offset of materials, the Contractor acknowledges that it gave particular consideration to clearances in advance of submitting its bid, and that no additional costs for these issues will be considered by the Owner.
- 8. If conflicting conditions or interferences develop, the Contractor and its Subcontractors will confer with the other contractors and their respective subcontractors whose work is affected to determine a

- solution acceptable to all interested parties. The suggested solution shall be submitted to the Architect for comment and, if necessary, written approval.
- The Contract Documents intend a first class finished product of such character and quality as described in and reasonably inferred from the Contract Documents. The Contractor will perform its Work to be complete and operable, fitting with the work of other contractors and the Owner, and in compliance with best construction practices and the ordinances, codes, and regulations of all bodies or persons having governmental or regulatory authority over the Contractor and its Work.
- § 1.2.5 Execution of the Contract by the Contractor is a representation that the Contractor has carefully examined the Contract Documents and the Project site, and represents that the Contractor is thoroughly familiar with the nature and location of the Work, the Project site, the specific conditions under which the Work is to be performed, and all matters which may in any way affect the Work or its performance. The Contractor further represents that as a result of such examinations and investigations, the Contractor thoroughly understands the Contract Documents and their intent and purpose, and is familiar with all applicable codes, ordinances, laws, regulations, and rules as they apply to the Work, and that the Contractor will abide by same. Claims for additional time or additional compensation as a result of the Contractor's failure to follow the foregoing procedure and to familiarize itself with all conditions and the Contract Documents will not be permitted.
- § 1.2.5.1 The Contractor certifies that it is experienced and familiar with the requirements and conditions imposed during the construction of similar work in the area. This includes, but is not limited to, "out of sequence" or "come back" work for the removal of plant, equipment, temporary wiring or plumbing, etc. This "out of sequence" work may also include phasing of construction activities to accommodate the installation of the Work at various locations and orderly fashion and the completion of Work at various locations or levels at various times. This "phasing," "out of sequence," or "come back" work shall be done at no cost to other Contractors, the Owner or Architect.

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

- § 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, sub-subcontractors, and suppliers do not own and cannot claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.
- § 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.
- § 1.5.3 The Contractor may not reproduce the Contract Documents in whole or in part for use as shop drawing backgrounds without the prior written consent of the Architect. If consent is given, the Architect shall determine the extent that the Contract Documents may be used in the preparation of shop drawings, as well as the fee that the Architect will be paid, if any and in the Architect's sole discretion, by the Contractor for such use of copyrighted documents.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be in writing and given, serviced or made (1) by depositing the same in the United States mail addressed to the authorized representative as specified in the Contract (or if no representative is specified to such party at the address stated in the Contract) of the party to be notified, postpaid and registered or certified with return receipt requested, (2) by depositing the same for overnight delivery (prepaid or billed to the party giving notice) with a nationally recognized overnight delivery service (e.g. Federal Express, USPS, UPS, etc.) addressed to the authorized representative of the party to be notified (or if no representative is specified to such party at the address stated in the Contract) or (3) by delivering the same in person to the said authorized representative of the party (or if no representative is specified to such party at the address stated in the Contract). Notices may be made by the party giving the notice by the party's counsel, the authorized representative of the party as specified in the Contract, or by an officer of the party that has authority to bind the party. Notices are to be sent to the designated representative of the party specified in the contract, when there is such designation, at address stated in the Contract. Notice deposited in the mail in accordance with this Section 1.6.1 shall be effective unless otherwise stated in the Contract from and after the fourth (4th) day following the date deposited in a U.S. mail receptacle or when actually received by the party to whom addressed, whichever is earlier. Notices transmitted by overnight delivery shall be effective the first business day (excludes holidays, Saturdays and Sundays) following the day of deposit with the nationally recognized overnight delivery service or when actually received by the party to whom addressed, whichever is earlier. Notice given by delivery in person shall be effective only if and when received by the party to be notified. By giving the other parties at least seven (7) days written notice thereof, the Contractor, Owner, Construction Manager and Architect have the right to change their respective designee and respective address to any address in the United States of America for receipt of notices.

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

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203TM-2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203TM—2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202TM–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights.

§ 2.1.3 The Owner, Architect or Construction Manager shall not supervise, direct or have control or authority over, nor be responsible for, the Contractor's means, methods, techniques, sequences or procedures of construction or the safety precautions and programs incident thereto, or for any failure of the Contractor to comply with laws and regulations applicable to the furnishing or performance of the Work. The Owner, Architect and Construction Manager shall not be responsible for the Contractor's failure to perform or furnish the Work in accordance with the Contract Documents.

§ 2.2 Evidence of the Owner's Financial Arrangements – Intentionally Omitted.

(Paragraphs deleted)

§ 2.3 Information and Services Required of the Owner

- § 2.3.1 All permits and fees, approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities are the responsibility of the Contractor under the Contract Documents with the exception of the building permit, which the Owner will obtain from the New York State Education Department. 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.
- § 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.
- § 2.3.3 The Owner shall retain a construction manager adviser lawfully practicing construction management in the jurisdiction where the Project is located. That person or entity is identified as the Construction Manager in the Agreement and is referred to throughout the Contract Documents as if singular in number.
- § 2.3.4 If the employment of the Construction Manager or Architect terminates, the Owner shall employ a successor construction manager or architect whose status under the Contract Documents shall be that of the Construction Manager or Architect, respectively.
- § 2.3.5 The Owner shall make available for inspection, upon request, that field survey or testing information of existing conditions that is known to be available and that is held by the Owner at its offices. Such records and documents are not Contract Documents, and the Owner makes no representation as to their accuracy or completeness. Notwithstanding the foregoing, information furnished by the Owner in the form of surveys, subsurface investigation reports, soil borings, and other material of a similar nature, is for general information only and is not a guarantee of the completeness or accuracy of such information, unless specifically noted otherwise herein. The Contractor shall verify all existing grades, conditions, and dimensions of existing physical conditions and structures and shall report any inconsistencies in writing to the Architect. The Contractor shall establish all lines and levels required to execute the Work and shall bear all costs involved, and shall be responsible for their accuracy and maintenance.

§ 2.3.6 Intentionally omitted.

- § 2.3.7 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one (1) set of Contract Drawings and Project Manuals for use during construction for their own use and for purposes of making reproductions pursuant to Section 1.5.2. The Owner shall furnish additional sets upon a Contractor's written request. Such additional sets will be provided at the cost of printing, postage and handling. Partial sets will not be provided. Subcontractors and other entities desiring copies of Drawings will be provided sets at the cost of printing, postage and handling.
- § 2.3.8 The Owner shall forward all communications to the Contractor through the Construction Manager. Other communication shall be made as set forth in Section 4.2.6.

§ 2.4 Owner's Right to Stop the Work

If the Contractor (1) fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2, or (2) fails to carry out Work in accordance with the Contract Documents as determined by the Owner, Architect or Construction Manager, 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 seven (7) days) any lien filed upon Owner's property by anyone claiming by, through, or under the Contractor, or (5) fails to perform the Work in a safe manner and in compliance with all applicable health and safety requirements and the Contractor's site specific health and safety plan or (6) disregards the instructions of the Architect, Owner or Construction Manager, as determined by the Owner, Architect or Construction Manager, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not

give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. Such order or stoppage by the Owner shall not constitute grounds for termination by the Contractor under Article 14 and shall not be a basis for an extension of the Contract Time under Section 8.3 or Article 15.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents (including but not limited to all applicable health and safety requirements) and fails within a three-day period after receipt of notice from the Owner, Architect or Construction Manager to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, after such three (3) day period and without prejudice to other remedies the Owner may have, correct such default or neglect at Contractor's expense. The Owner's reasonable cost of correcting such default or neglect shall be deducted from payments due the Contractor by Change Order, Construction Change Directive, back charge or other means. The Construction Manager or Architect may, pursuant to Section 9.5.1, withhold, modify and/or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies. The Owner's reasonable costs shall include the cost of labor and materials to complete the correction of such default or neglect, the Owner's expenses and compensation for the Construction Manager's and Architect's and their respective consultants' additional services made necessary by such default, neglect, or failure, and, without limitation, the Owner's reasonable attorney's fees, including attorney's fees incurred in the course of enforcing Owner's rights under this provision. If current and future payments due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

§ 2.5.1 Where the Contractor's default and/or neglect to carry out its Work in accordance with the Contract Documents threatens the health, safety and/or welfare of the occupants of the Owner's facilities and/or threatens the structural integrity and/or preservation of the Owner'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. In such case an appropriate Change Order or Construction Change Directive shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies and defaults, including the Owner's expenses and compensation for the Architect's and its respective consultants' additional services and other expenses made necessary by such default, neglect or failure.

§ 2.6 Extent of Owner's Rights

- § 2.6.1 The rights stated in this Article 2 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner (1) granted in the Contract Documents, (2) at law or (3) in equity.
- § 2.6.2 In no event shall the Owner, Architect or Construction Manager have any responsibility for the Contractor's construction means, methods, techniques, sequences or procedures or for safety precautions and programs in connection with the Work notwithstanding any of the rights and authority granted the Owner in the Contract Documents.

ARTICLE 3 CONTRACTOR

§ 3.1 General

- § 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.
- § 3.1.2 The plural term "Multiple Prime Contractors" when used herein refers to persons or entities who perform construction under contracts with the Owner that are administered by the Construction Manager. The term does not include the Owner's own forces, including persons or entities under separate contracts not administered by the Construction Manager.
- § 3.1.3 The Contractor shall perform the Work in accordance with the Contract Documents.
- § 3.1.4 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Construction Manager or Architect in their administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

The Contractor shall maintain complete inspection records and test date to ensure the quality of the Work is in strict compliance with the requirements of the Contract Documents.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

- § 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.
- § 3.2.1.1 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the Contract Documents relative to that portion of the Work, as well as with information furnished by the Owner pursuant to Section 2.3.5, shall take field measurements of any existing conditions related to that portion of the Work, shall observe any conditions at the site affecting it, and shall at once report in writing to the Construction Manager and the Architect errors, inconsistencies or omissions discovered. The Contractor shall not be liable to the Owner, the Construction Manager or the Architect for damage resulting from errors, inconsistencies or omissions in the Contract Documents unless the Contractor knew or reasonably should have known of such error, inconsistency or omission and failed to report it as required by this section to the Construction Manager and the Architect. If the Contractor performs any construction activity knowing it involves, or reasonably should have known it involves, a recognized error, inconsistency or omission in the Contract Documents without such notice to the Construction Manager and the Architect, the Contractor shall assume full responsibility for such performance and shall bear sole responsibility for the costs for correction.
- § 3.2.1.2 The obligations of the Contractor under Section 3.2.1.1 and this Section 3.2.1.2 are for the purpose of facilitating construction by the Contractor and are not for the purpose of imposing an affirmative obligation on the Contractor to discover errors, omissions, or inconsistencies in the design information in the Contract Documents. The Contractor's review of the Contract Documents is made in the Contractor's capacity as a contractor and not as a licensed design professional unless otherwise specifically so provided in the Contract Documents.
- § 3.2.1.3 Failure by the Contractor to promptly report any errors, inconsistencies, or omissions in the Contract Documents discovered by the Contractor, or which the Contractor reasonably should have known or discovered, shall constitute a waiver by the Contractor of any claim that otherwise might result in a change in the Contract Sum or Contract Time.
- § 3.2.1.4 The representations of the Contractor as set forth in these General Conditions shall survive expiration or termination of the Agreement.
- § 3.2.2 The Contractor shall be presumed to have examined the Project site(s) to consider fully all conditions that may have a bearing on the Work and to have accounted for these conditions its proposal. The Contractor is deemed to be a qualified expert in the systems and construction requirements of the Work of its Contract. The Contractor hereby specifically acknowledges and declares that the Contract Documents are full and complete, are sufficient to have enabled it to determine the cost of the Work, and that the Drawings, the Specifications, and all Addenda are sufficient to enable the Contractor to construct the Work outlined therein in accordance with applicable laws, statutes, building codes, and regulations, and otherwise to fulfill all of its obligations under the Contract Documents. 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 Construction Manager and the Architect at once. The exactness of grades, elevations, dimensions, or locations given on any Drawings issued by the Architect, or the work installed by other Contractors, is not guaranteed by the Architect, Construction Manager or the Owner. The Contractor shall, therefore, satisfy itself as to the accuracy of all grades, elevations, dimensions, and locations. In all cases of interconnection of its Work with existing or other work, the Contractor 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, dimensions, or locations shall be promptly rectified by the Contractor without any additional cost to the Owner. Except as to any reported errors, inconsistencies or omissions, and except as to concealed or unknown conditions, by executing the Agreement, the Contractor represents to the Owner, Construction Manager, and the Architect that the Work required by the Contract Documents, including, without limitation, all construction details, construction means, methods, procedure and techniques necessary to perform the Work, use of materials, selection of equipment and requirements of product manufacturers are consistent with: (1) good and sound practices within the construction industry; (2) generally prevailing and accepted industry standards applicable to Work; (3) the

requirements of any warranties applicable to the Work; and (4) all laws, ordinances, regulations, rules and orders which bear upon the Contractor's performance of the Work.

- § 3.2.3 The Contractor shall perform the Work in accordance with the Contract Documents and submittals approved pursuant to Section 3.12.
- § 3.2.4 The Contractor may submit Requests for Information ("RFI") to the Architect to help facilitate the Contractor's performance of the Work. Prior to submitting each RFI, the Contractor shall first carefully study and compare the Contract Documents, field conditions, other Owner provided information, Contractor-prepared Coordination Drawings, and prior Project correspondence and documentation to determine that the information to be requested is not reasonably obtainable from such sources. The Contractor shall submit each RFI sufficiently in advance of the date by which such information is required in order to allow the Architect sufficient time to permit adequate review and response and to permit Contractor compliance with the latest construction schedule. The Contractor shall reimburse the Owner amounts charged by the Architect for RFI responses that in the opinion of the Architect were available from a careful review of the Contract Documents, field conditions, other Owner provided information, Contractor-prepared Coordination Drawings, and prior Project correspondence and documentation.
- § 3.2.4.1 RFIs are for requests on clarifications or questions on Drawings and Specifications, not Contract terms, scheduling items, or general correspondence, nor, as a means to describe or request approval of alternate construction means, methods or concepts or substitution or materials, systems means and methods. The Contractor shall fill all RFIs out in accordance with the provisions of the Project Manual. Neither the Architect nor the Construction Manager shall fill said forms out on the Contractor's behalf.
- § 3.2.5 If the Contractor, during the progress of the Work, discovers any discrepancies between the Drawings and the Specifications, errors and/or omissions on the Drawings, or any discrepancies between physical conditions of the Work and the Drawings, and has notified the Architect and Construction Manager in writing under Section 3.2.1, no deviations from the Contract Documents shall be performed by the Contractor until it receives approval in writing from the Architect through the Construction Manager. Any Work performed after such discovery without the approval of the Architect shall be at the Contractor's sole risk and expense.
- § 3.2.6 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Construction Manager and the Architect any nonconformity discovered by or made known to the Contractor as a RFI submitted to the Architect.
- § 3.2.7 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or RFIs pursuant to Sections 3.2.1, 3.2.2, 3.2.4, 3.2.5 or 3.2.6, the Contractor shall make a Claim as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.1, 3.2.2, 3.2.4, 3.2.5 or 3.2.6, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or the Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.
- § 3.2.8 The Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of Owner. The Contractor shall report to the Construction Manager and Architect whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.
- § 3.2.8.1 The Contractor shall be required to establish centerlines, elevations and location of his work when it is required for the benefit of other Contractors needing the information to coordinate location of their work.
- § 3.2.9 Whenever the Drawings show existing or other construction not required as part of the Contract Work, it is understood that it is so shown as a matter of information and that the Owner, while believing such information to be

substantially correct, assumes no responsibility thereof. The Contractor shall make itself familiar with all conditions affecting the nature and manner of conducting the Work.

- § 3.2.10 Claims for additional compensation or extension of time due to the Contractor's failure to familiarize itself with the conditions at the Project site will not be allowed.
- § 3.2.11 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for evaluating and responding to the Contractor's requests for information that are not prepared in accordance with the Contract Documents or where the requested information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

§ 3.3 Supervision and Construction Procedures

- § 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention, and shall complete the Work in a good and workmanlike manner in accordance with the Contract Documents. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work subject to the coordination of the Construction Manager. Where the Drawings 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.
- § 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors, Suppliers, and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors, Suppliers or Sub-subcontractors, and for any damages, losses, costs and expenses resulting from such acts or omissions, including but not limited to reasonable attorneys' fees.
- § 3.3.3 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 be responsible to the Owner for the acts or omissions of the Contractor's employees, the Contractor's Subcontractors, the Contractor's material suppliers, their respective agents and employees, and any other persons performing portions of the Work on behalf of the Contractor.
- § 3.3.3.1 The Contractor shall coordinate its operations and cooperate with those of other Contractors performing work on the Project or site thereof to ensure efficient and orderly installation of each part of the Work. Cooperation will be required in the arrangement for the storage of materials and in the detailed execution of the Work. The Contractor shall remain informed of the progress and the detail work of other Contractors and shall notify the Construction Manager immediately of lack of progress or defective workmanship on the part of other Contractors, where such delay or such defective workmanship will interfere with Contractor's own operations. Failure of the Contractor to keep informed of the work progressing on the site or to give notice of lack of progress or defective workmanship by others shall be construed as acceptance of the progress of work and coordination with Contractor's own Work.
- § 3.3.2 The Contractor's obligations under the Contract Documents shall include, without limitation, the following:
 - Review of all specified construction and installation procedures with its employees and/or Subcontractors, including, without limitation, those recommended by manufacturers, prior to the commencement of the relevant portion of the Work to be performed.
 - Advising the Construction Manager and the Architect: .2
 - if a specified procedure deviates from best construction practice; .1
 - .2 if following a procedure will affect any warranties, including the Contractor's general warranty; or

- of any objections the Contractor may have to a procedure.
- .3 Proposing alternative procedures, as appropriate, which procedures shall be covered by the Contractor's warranty as described in Section 3.5 hereof.
- .4 The Contractor shall be responsible for organizing and conducting pre-installation conferences and must coordinate such conferences with the Architect and the Construction Manager.
- § 3.3.3.3 The Contractor and its Subcontractors working on the Project shall attend a preconstruction conference(s) or meeting(s) as deemed necessary by the Construction Manager to coordinate all Work (e.g., demolition, installation, etc.), and as required by the Project Manual.
- § 3.3.4 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Construction Manager or the Architect in their administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor. The Contractor shall maintain complete inspection records and test date to ensure the quality of the Work is in strict compliance with the requirements of the Contract Documents.
- § 3.3.5 Where equipment lines, piping, ductwork, and/or conduit are shown diagrammatically, the Contractor shall be responsible for the coordination and orderly arrangement of the various lines of piping and conduit included in the Work of its Contract. The Contractor shall coordinate the work of its Subcontractors and prevent all interferences between or among equipment, lines of piping, and architectural features, and avoid any unsightly arrangements in exposed areas. This Section shall not be construed as limiting any obligation of the Contractor under any other provision of the Contract Documents.
- § 3.3.6 The Contractor shall be responsible for inspection of portions of the Project already performed to determine that such portions are in proper condition to receive subsequent Work.
- § 3.3.7 The Contractor, its employees and Subcontractors, shall be subject to such rules and regulations for the conduct of Work as the Owner may establish, including but not limited to, the Construction Rules and Regulations set forth in Section 3.13.4. The Contractor shall be responsible for the enforcement among its employees of the Owner's instructions.
- § 3.3.8 The Contractor shall inspect all materials as delivered to the Project site and shall reject any materials that will not conform with the requirements of the Contract Documents when properly installed.
- § 3.3.9 The Contractor shall be responsible for and coordinate any and all inspections required by any governmental body having jurisdiction over the Project. Failure to obtain any permits, licenses or other approvals because of the failure of the Contractor to conform to this requirement shall not extend the Contract time, and the Contractor shall not be entitled to any increase in the Contract Sum therefore. In addition, any additional costs and expenses of any nature incurred by the Owner as a result of the Contractor's failure to conform to this requirement shall constitute a charge against the Contractor's Contract.
- § 3.3.10 Shutdowns: Such work as connections to existing sewers, plumbing, heating, and electrical systems shall be coordinated at a time agreeable to the Owner, the Architect, and the Construction Manager, and shall be determined and agreed to well in advance of the actual performance of such work so as to interfere as little as possible with the operation and use of the Owner's existing facilities. Shutdowns must be coordinated through the Construction Manager. The continued uninterrupted operation of all facilities of the Owner's buildings is essential. If any existing facilities must be interrupted, the Contractor for the Work shall provide all necessary temporary facilities and connections necessary for maintaining these existing facilities at no increase in the Contract Sum except as otherwise specified. No mechanical, heating, plumbing, sprinkler, or electric service shall be interrupted at any time except as approved in advance by the Owner or when the buildings are not occupied and shall be coordinated with the Owner, as well as the Construction Manager. All communication systems must be maintained without interruption. As much related work as possible shall be performed prior to shutdowns, so as to minimize the period of shut down. All material, equipment, and manpower necessary in the performance of a shutdown shall be on site prior to interruption of service.

§ 3.4 Labor and Materials

- § 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor (at applicable prevailing wage rates), materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. All materials provided by Contractor shall be new. The Contractor shall work continuously and expeditiously through completion of the Work. Time is of the essence.
- § 3.4.1.1 Notwithstanding any other provision of the Contract Documents, the Contractor shall perform at least twenty-five (25%) percent of the field work with its own full-time employees. For the purpose of the preceding sentence any part of the work performed by supervisory personnel (persons above level of foreman) or by office personnel shall not be considered part of the Work performed by the Contractor's employees. Such items as bonds, certificates, shop drawings and similar items are not to be counted as satisfying the twenty five (25%) percent requirement.
- § 3.4.1.2 A shortage of labor in the industry shall not be accepted as an excuse for not properly manning the Project at each site.
- § 3.4.1.3 The Contractor shall be responsible for the care and protection of all equipment and materials for its Work on the Project, including equipment and material furnished by the Owner.
- § 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect, in consultation with the Construction Manager, and in accordance with a resulting Change Order or Construction Change Directive.
- § 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them, or persons who within the last two weeks (a) having been exposed to someone having been diagnosed with a COVID-19 infection; or (b) having had a persistent cough, shortness of breath, or a fever of 100.4 or higher. The Owner reserves the right to have any persons removed from the Project upon reasonable objection.
- § 3.4.3.1 In addition to all other safety requirements, the Contractor shall provide suitable and a sufficient number of safety related facilities and personal protective equipment (PPE) at the site related to protection against the spread of COVID-19, including but not limited to handwashing stations, hand sanitizer, gloves, masks, faceshields, and other equipment as the Owner may reasonably request. Notwithstanding the foregoing, nothing herein shall be construed to delegate or relieve Contractor from having sole and exclusive responsibility for all worksite safety.
- § 3.4.4 All mechanics employed on the Project shall be persons skilled in that work which they are to perform. Work will not be approved if it does not meet the quality of workmanship as called for in the Contract Documents. If this quality of workmanship is not exactly defined herein, it shall be assumed to be the best standards of workmanship for the trade.
- § 3.4.5 Employees of the Contractor or its Subcontractors whose work is unsatisfactory to the Owner, Construction Manager or Architect, or considered by them to be unskilled or otherwise objectionable, will be immediately dismissed from the Project upon notice from the Construction Manager. Those dismissed employees shall be immediately replaced by the Contractor so as not to delay progress of the Work and at no additional cost to the Owner.
- § 3.4.6 On receipt of the signed Contract, the Contractor will be expected to place firm orders with vendors for needed materials, including Subcontractors and major material suppliers. If deemed necessary to assure delivery of materials at times needed, the Contractor may accept delivery of such materials at any time, and may include the cost of such materials in its next monthly Application for Payment, provided such materials have actually been delivered to Contractor and properly stored by it with approval or under direction of the Architect and the Construction Manager either at the Project site or in an approved storage shed or warehouse, as provided elsewhere in these General Conditions.

- § 3.4.6.1 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 the Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
- § 3.4.6.2 The Contractor is responsible for providing products and construction methods compatible with products and construction methods of other Contractors. If a dispute arises between the Contractor and other Contractors over concurrently selectable but incompatible products, the Architect will determine which products shall be used.
- § 3.4.6.3 With respect to sitework materials, all products submitted for use and incorporated into the Project shall be on the Approved List of Materials and Equipment published by the NYSDOT Materials Bureau, most recent edition.
- § 3.4.6.4 When required, off-site storage shall be the responsibility of the Contractor. If materials are stored off site, the Contractor shall furnish proof of title by Owner and provide a certificate of insurance demonstrating adequate insurance coverage.
- § 3.4.6.5 The Contractor shall deliver all materials at such times as will ensure speedy and uninterrupted progress of the Work.
- § 3.4.6.6 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them The Owner reserves the right to object to Contractor's use of persons who appear unfit or not skilled in the tasks assigned to them. Should any disorderly, incompetent, unfit, unskilled or objectionable person be hired or employed by the Contractor, upon or about the Premises of the Owner, for any purpose or in any capacity, they shall, upon request of the Owner, be removed from the Project and not again be assigned thereon without the written permission of the Owner.
- § 3.4.7 The Contractor warrants that it has good title to all materials used by it in, on or in connection with the Work. No materials or supplies shall be purchased by the Contractor or any of its Subcontractors that are subject to any chattel mortgage, conditional sale, or other agreement by which an interest is retained by the seller.
- § 3.4.8 The Contractor shall make every reasonable effort to avoid labor disputes and to insulate the Owner, Architect and Construction Manager from the effects of labor disputes should any arise. 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. For the purposes of this Section, every reasonable effort shall include, but not necessarily be limited to:
 - make all necessary arrangements to reconcile, without delay, damage or cost to the Owner and without recourse to the Architect, the Construction Manager or the Owner, any conflict between its Agreement with the Owner and any agreements or regulations of any kind at any time in force among members or councils which regulate or distinguish what activities shall not be included in the work of any particular trade:
 - .2 requiring employees, Subcontractors, suppliers and others to use reserve gates which shall be established for the Project;
 - .3 rearranging work schedules for the Contractor's Work or the work of its Subcontractors; and
 - .4 including in Contractor's agreements with its Subcontractors the right to fully implement all provisions of this Section.
- § 3.4.8.5 In case the progress of the Work is effected by any undue delay in furnishing or installing any items or materials or equipment required pursuant to the Contract 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 Work.

- § 3.4.8.5.1 No extension of the Contract Time shall be granted for delays caused by labor or material disputes.
- § 3.4.8.5.2 Should it become necessary to create a separate entrance for a Contractor involved in a dispute, all costs associated with creating that entrance shall be borne by the Contractor involved in the dispute. Such costs shall include, but not limited to signage, fencing, temporary roads and security personnel as deemed necessary by the Owner for the safety of the occupants of the site.
- § 3.4.8.6 The Contractor shall ensure that its Work continues uninterrupted during the pendency of a labor dispute.
- § 3.4.8.7 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 arising from the labor practices of the Contractor or its Subcontractors, Suppliers or Sub-subcontractors.
- § 3.4.9 The Contractor and its Subcontractors employed upon the Work shall abide by and conform with all labor laws and to all other laws, ordinances, and legal requirements now or hereafter applicable to the Work and the construction
- § 3.4.10 The Contractor and its Subcontractors shall be responsible for protection of the Work, the work of Separate or other Contractors, and existing construction, both on and off the site, and in the event of damage, shall restore the same to the original condition at no additional cost to the Owner.
- § 3.4.11 If the Work is to be performed by trade unions, the Contractor shall, with the consent of the Owner and the Architect, which shall not be unreasonably withheld, make all necessary arrangements to reconcile, without delay, damage, or cost to the Owner, any conflict between the Contract Documents and any agreements or regulations of any kind, at any time in force among members or councils that regulate or distinguish what activities are included in the work of any particular trade.
- § 3.4.12 No new asbestos containing building materials shall be used in construction. No materials containing asbestos in any form shall be used in, on, or around the Owner's buildings.

§ 3.4.13 Equivalents and Substitutions

- § 3.4.13.1 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, it shall indicate in writing, and prior to award of the 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 equivalents as provided in the Project Manual. Any proposed equivalent shall not be purchased or installed by the Contractor without the Architect's review process having been completed and the product accepted by written notification.
- § 3.4.13.2 Substitutions. After the Contract has been executed, the Owner, Construction Manager and Architect will consider a formal request for the substitution of products in place of those specified only under conditions set forth in the Specifications.
- § 3.4.13.3 By making said requests in conformance with procedures established herein and elsewhere in the Project Manual, the Contractor: (1) represents that it has personally investigated the proposed substitute product and has determined that it is equal to or superior in all respects to that specified; (2) represents that the warranty for the substitution will be the same, or greater than, that applicable to the specified product; (3) certifies that the cost data is complete and includes all related costs under the Contract, including professional services necessary and/or required for the Architect or its consultants to implement said substitution and waives any and all claims for additional costs related to the substitution which subsequently become apparent; (4) represents that it will coordinate the installation of the accepted substitute, making all such changes to the Drawings effected by the change, 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; and (5) represents that it will reimburse the Owner for all additional costs billed by the Architect or its consultants for the review of the substitution request(s), any redesign of the Work of this Contractor or associated contractors, additional site visits related to the substitution request and for the work to prepare Change Orders or Construction Change Directives.

- § 3.4.13.4 Substitutions and alternates may be rejected without explanation and will be considered only under one or more of the following conditions:
 - .1 required for compliance with interpretation of code requirements or insurance regulations then existing;
 - .2 unavailability of specified products, through no fault of the Contractor;
 - .3 subsequent information discloses inability of specified products to perform properly or to fit in designated space;
 - .4 manufacturer/fabricator refuses to certify or guarantee performance of specified products as required;
 - .5 when in the judgment of the Owner, a substitution would be substantially in the Owner's best interests, in terms of costs, time or other considerations; and
 - .6 where the Contractor establishes that the substituted product is equal or better than the specified product in all respects.

§ 3.5 Warranty

- § 3.5.1 The Contractor warrants to the Owner, Construction Manager and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants good title to all materials, supplies, and equipment installed or incorporated in the Work. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements, including substitutions not properly approved and authorized, shall be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. All warranties and guarantees specifically called for by the Contract Documents shall expressly run to the benefit of the Owner. If required by the Architect, the Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with instructions of the applicable supplier, except as otherwise provided in the Contract Documents. The Contractor shall perform the Work in strict accordance with the Contract Documents and best industry practices. The Contractor, at its expense, shall upon demand by the Owner, Construction Manager or Architect remove and replace materials not meeting specifications or materials failing to perform as represented or warranted by the manufacturer, regardless of whether incorporated into the Work. The Contractor shall promptly replace or correct any Work or materials that the Owner, Construction Manager or Architect rejects as failing to conform to the requirements of the Contract Documents. The foregoing warranty obligations shall survive completion or termination of the Contract, are not limited by the provisions of Article 12, and are in addition to and not in limitation of any other warranty, right or remedy set forth in the Contract Documents or otherwise prescribed by law.
- § 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4. The Contractor shall assign to the Owner at the time of final completion of the Work any and all manufacturer's warranties relating to materials and labor used in the Work and further agrees to perform the Work in such manner so as to preserve any and all such manufacturer's warranties. The Contractor shall fully cooperate with the Owner in the event the Owner pursues remedies under any warranties assigned to the Owner. The Contractor acknowledges that its obligations to the Owner under Section 3.5 are joint and several with its Subcontractors, suppliers, and material or equipment manufacturers of all materials and equipment supplied on account of the Work.
- § 3.5.3 No warranties or guarantees by the Contractor will deprive the Owner of any cause of action, right, or remedy otherwise available for breach of any of the provisions of the Contract Documents. Neither final payment nor provision in the Contract Documents nor partial or entire occupancy of premises by Owner shall constitute an acceptance of Work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibilities for faulty or defective materials or workmanship.
- § 3.5.3.1 The Contractor shall deliver to the Owner upon completion of all work under its Contract, its written guarantee made out to the Owner in a form acceptable to the Owner, guaranteeing (and it does so guarantee) all of the Work under the Contract to be free from faulty materials, and free from improper workmanship, and guarantees against injury from proper and usual wear and aging. This guarantee shall also be made to cover (and does cover) a

period of two (2) years from the date of Substantial Completion all work under the Contract as required by Article 12 hereof, or for a longer period where so stipulated in the Contract Documents.

- § 3.5.4 All required maintenance shall be the Contractor's responsibility until the Owner has accepted the Project as complete, all required maintenance and user's manuals have been turned over to the Owner, and the Owner's designated personnel have been instructed in the maintenance and operation of all applicable materials. This maintenance shall include a complete turnover procedure at the time of completion, including complete cleaning, testing and adjustment. The Contractor shall keep records of all such maintenance performed as required by this Section, including work performed and times and dates on which it was performed. These records shall be turned over to the Owner at closeout.
- § 3.5.5 The Contractor shall in case of work performed by its Subcontractors, and where guarantees are required, secure warranties from Subcontractors and deliver copies of same to the Construction Manager countersigned by the Contractor.
- § 3.5.6 Neither final payment nor provision in the Contract Documents nor partial or entire occupancy of premises by Owner shall constitute an acceptance of Work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibilities for faulty or defective materials or workmanship.

§ 3.6 Taxes

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

- § 3.6.1 The Owner is exempt from payment of federal, state, and local sales and compensation use taxes on all supplies and materials incorporated into and becoming an integral component part of the structures, buildings, or real property pursuant to this Contract. Such taxes are therefore not to be included in the Contractor's bid or the Contract Sum. The Owner shall deliver to the Contractor the appropriate exemption certificate required to be supplied by the Owner, and the Contractor and its Subcontractors and materialmen shall be solely responsible for obtaining and delivering any and all exemption or other certificates and for furnishing a Contractor Exempt Purchase Certificate or other appropriate certificates to all persons, firms, or corporations from whom they purchase supplies, materials, and equipment for the performance of the Work.
- § 3.6.1.1 The Contractor's attention is called to fact that materials not actually incorporated into Work will not be exempt from payment of sales or compensating use taxes, and the Contractor and its Subcontractor shall be responsible for and shall pay any and all applicable taxes. This will apply to such things as:
 - construction machinery and equipment including rentals or repair parts; .1
 - .2 The Contractor's office supplies;
 - .3 The Contractor's supplies, tools and miscellaneous equipment including forms, materials, and scaffolding (whether purchased or rented);
 - .4 temporary heat;
 - .5 telephone or electric services; and
 - .6 any other items purchased or rented by the Contractor for the Contractor's use in performing its Work and not incorporated into realty.
- § 3.6.2 The Contractor accepts full and exclusive liability for payment of any and all contributions, assessments or taxes for unemployment insurance or old age insurance, or annuities now or hereafter imposed by the government of the United States, or by the government of any city, county or state of United States, which are measured by salaries or other remuneration paid to persons employed by the Contractor or any Subcontractor for Work performed under this Contract.

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

§ 3.7.1 The Contractor shall, as soon as practicable, furnish the Owner, Architect, and Construction Manager with copies or certificates of all permits, fees, licenses, and inspections necessary for the proper execution and completion of the Work, including, without limitation, all applicable building permits other than those required of the Owner under Sections 2.3.1. All inspection fees and other costs of such permits and licenses required to be obtained by the

Contractor as may be imposed by any municipal or other entity shall be paid by the Contractor and shall not serve as the basis for any increase in the Contract Sum.

- § 3.7.2 The Contractor shall comply with, and give notices required by, applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. 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 and (b) the Architect, Construction Manager and their 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.
- § 3.7.2.1 In accordance with New York State Labor Law Article 8, Section 220, subd. 3-a(a), the Contractor shall submit to the Owner within 30 days after issuance of Contractor's first payroll, and every 30 days thereafter, a transcript of the original payroll record, subscribed and affirmed as true under the penalties of perjury.
- § 3.7.2.2 The Contractor shall comply with all applicable New York State Department of Labor requirements, including the provision that every worker employed in performance of a public work contract shall be certified as having completed an OSHA 10-hour safety training course. The Contractor and its Subcontractors shall be solely responsible for compliance with this requirement with respect to their employees. The Contractor's or Subcontractor's failure to comply with this requirement shall not transfer or in any way impose the responsibility for worker safety upon the Owner or the Architect.
- § 3.7.3 If the Contractor performs Work contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear all costs attributable to the correction thereof or related thereto, including reimbursement to the Owner for any additional services required of the Construction Manager or Architect, or both, as well as all fines and penalties, if any.
- § 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall give prompt written notice to the Owner, Construction Manager, and the Architect of such conditions before they are disturbed or affected work is performed and in no event later than three (3) business days after first observance of the conditions. The Architect or Construction Manager will promptly investigate such conditions and, if the Architect, in consultation with the Construction Manager, determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect, in consultation with the Construction Manager, determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner, Construction Manager, and Contractor in writing, stating the reasons. If the Contractor disputes the Architect's determination or recommendation, it may proceed as provided in Article 15. No adjustment in the Contract Time or Contract Sum will be permitted, however, in connection with a concealed or unknown condition that does not differ materially from those conditions disclosed or that reasonably should have been disclosed by the Contractor's (1) prior inspections, tests, and reviews, or (2) inspections, tests, and reviews the Contractor had the opportunity to make or should have performed in connection with the Project.
- § 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner, Construction Manager, and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents:

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

§ 3.9 Superintendent

- § 3.9.1 Prior to starting the Work, the Contractor shall designate the Project Manager, a full-time Superintendent and other key individuals who shall be assigned to the Project through and including Final Completion. Such designations shall be in writing and provided to the Construction Manager, Architect and Owner and shall include the qualifications of such individuals. The Superintendent shall be in attendance at the Project site throughout the Work, remain on the Project site not less than eight hours per day, five days per week, until termination of the Contract, unless the job is suspended, work is stopped by the Owner, or no work is scheduled. The Superintendent shall be approved by the Owner in its sole discretion. Said representatives shall be qualified in the type of work to be undertaken and shall not be changed during the course of construction without the prior written consent of the Owner. Should a representative leave the Contractor's employ, the Contractor shall promptly designate a new representative. The Owner shall have the right, at any time and in its sole discretion, to direct a change in the Contractor's representatives if their performance is unsatisfactory. In the event of such a demand, the Contractor shall within seven (7) days after notification thereof, replace said individual(s) with an individual(s) satisfactory to the Owner, in the Owner's sole discretion. If said replacement is disapproved, the Contractor may, at the Owner's option, be terminated for cause. The Superintendent shall represent the Contractor, and communications given to the Superintendent shall be as binding as if given to the Contractor. The Owner shall have no obligation to direct or monitor the Contractor's employees. All references herein to the Superintendent shall be taken to mean the Contractor's superintending staff. Each Subcontractor shall designate the Project Manager, Superintendent and other key individuals who shall be assigned to the Project. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case. The Contractor's Superintendent shall attend all Project meetings, regardless of whether held prior to or following Substantial Completion of the Work.
- § 3.9.2 The Contractor shall provide, or otherwise see that, the Project Manager, or Superintendents or responsible workers of the Contractor and its major Subcontractors are equipped with cellular phones and radios. The Contractor shall provide the Owner, the Construction Manager, and the Architect with the number for each phone and worker.
- § 3.9.3 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 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.
- §3.9.4 The Contractor shall not reduce or terminate supervision of the Work, nor change the superintendent without the prior written approval of the Owner.
- §3.9.5 If, for any reason, the Contractor takes an action resulting in any of the changes noted in Subsection 3.9.4, the Owner may take remedial action to insure continued progress of the Work, including the hiring of suitable supervisory personnel, and charge the Contractor all costs associated with these remedial actions including the costs of legal and additional construction management and architectural services.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly, but in no event later than 14 days, after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information and the Construction Manager's approval a Contractor's construction schedule for the Work in electronic format with predecessor logic. The construction schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The Contractor's construction schedule shall provide for the orderly progression of the Work to completion, and shall not exceed time limits current under the Contract Documents. The Contractor shall cooperate with the Construction Manager in scheduling and performing the Contractor's Work to avoid conflict with, and as to cause no delay in, the work or activities of other Multiple Prime Contractors or the construction or operations of the Owner's own forces. The Contractor's construction schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project but the Contract Time and any applicable Milestone Date shall not be changed except by fully executed Change Order.

The construction schedule shall be in a detailed precedence style critical path method (CPM) or Primavera-type format satisfactory to the Owner, the Construction Manager and the Architect which shall also:

- provide a graphic representation of all activities and events that will occur during performance of the Work including the submission, review and approval of all submittals (i.e. Shop Drawings, etc.) re-quired by the Contract Documents;
- (b) identify with each phase of construction and occupancy; and
- (c) set forth dates that are critical in insuring the timely and orderly completion of the Work in accordance with the requirements of the Contract Documents (hereinafter referred to as the Milestone dates).

Upon review and acceptance by the Owner and the Construction Manager of the Milestone Dates, the construction schedule shall be deemed part of the Contract Documents and attached to the agreement as Exhibit "A". If not accepted by the Owner and the Construction Manager, the construction schedule shall be promptly revised by the Contractor in accordance with the recommendations of the Owner and the Construction Manager and re-submitted for acceptance.

(Paragraph deleted)

- § 3.10.1.1 Time is of the essence for this Project. The Work shall be performed continuously and without interruption, so that all Work can be completed in the time set forth in the Contract Documents. The accepted construction schedule shall be dated to reflect actual conditions (sometimes referred to as progress reports) as set forth in this Section or if requested by the Owner, Construction Manager or Architect.
- § 3.10.1.2 The sequence of the Work shall be scheduled with the Owner so as to minimize interference with the Owner's use of existing structures, and the Owner's approval shall be obtained prior to starting of the Work.
- § 3.10.1.3 The Contractor shall conform to the most recent Project Schedule, and all Work shall be completed on or before the dates established in the Contract Documents. The Contractor shall monitor the progress of the Work for conformance with the requirements of the Project Schedule and shall promptly advise the Owner and Construction Manager of any delays or potential delays.
- § 3.10.2.1 The Construction Manager shall prepare, publish, and, from time-to-time, revise a master integrated Project Schedule based upon the construction schedules submitted by the Contractor and other Contractors. Failure by the Contractor to furnish any required schedule or schedule revision in a timely manner shall entitle the Construction Manager to prepare a schedule for the Contractor's Work, to which the Contractor shall be bound.
- § 3.10.2.2 The Contractor shall cooperate with the Construction Manager in scheduling and performing the Contractor's Work to avoid conflict, delay in or interference with the Work of other Contractors or the construction or operations of the Owner's own forces. The Owner shall have the right, without penalty, to direct the Contractor to delay, postpone or reschedule any portion of the Work that may interfere with or disrupt the operations of the Owner.
- § 3.10.3 The Contractor shall conform to the most recent Project Schedule.

- § 3.10.4 In the event the Owner determines that the performance of the Work has not progressed to the level of completion required of the Contract Documents or that the Contractor has failed to maintain its construction schedule or the Project Schedule, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction including without limitations, additional shifts, overtime, additional manpower or equipment as well as other similar measures (hereinafter referred to collectively as "extraordinary measures"). Such extraordinary measures shall continue until the progress of Work complies with milestone and critical path dates set forth in the Contract Documents and the Project Schedule. The Contractor shall not be entitled to an adjustment in Contract Sum or Contract Time in connection with extraordinary measures required by the Owner.
- § 3.10.5 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter update it as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Construction Manager's and Architect's approval. The Architect and Construction Manager's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Construction Manager and Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.
- § 3.10.6 The Contractor shall participate with other Contractors, the Construction Manager and Owner in reviewing and coordinating all schedules for incorporation into the Project Schedule that is prepared by the Construction Manager. The Contractor shall revise the construction schedule and submittal schedule as deemed necessary by the Construction Manager to conform to the Project Schedule and the Contract Documents.
- § 3.10.7 The Contractor shall perform the Work in general accordance with the most recent construction schedules submitted to the Owner, Construction Manager and Architect and incorporated into the approved Project Schedule. The Contractor shall monitor the progress of the Work for conformance with the requirements of its construction schedule and Project Schedule and shall promptly advise the Owner of any delays or potential delays affecting the critical path.
- § 3.10.8 If the Contractor fails to maintain the approved construction schedule or Project Schedule and meet all critical path dates for the Work, the Owner may request a recovery plan from the Contractor and reserves the right to withhold payment until such time as the Contractor submits a recovery plan. The recovery plan must show how the Work may plausibly be brought on schedule, including, as necessary, acceleration of the Work by means of overtime, additional crews, additional shifts, additional equipment or re-sequencing of the Work to achieve completion of the remaining critical path dates in the construction schedule or Project Schedule. The Contractor shall submit as part of its recovery plan: (i) a "resource loaded" schedule showing the Contractor's plan to deploy manpower per trade, per work area, per day, together with essential materials and equipment, and other resources necessary to timely accomplish the Work; and (ii) a two-week "look ahead" schedule identifying tasks to be accomplished within the coming two week period, the work areas and categories of work, and necessary manpower resources, together with other data necessary to demonstrate to the Owner the viability of the Contractor's recovery plan ("2 Week Plans"). The Contractor shall continue to submit 2 Week Plans until either the Contractor demonstrates that the Project Schedule has recovered from the unexcused delay, or the Owner notifies the Contractor in writing that further 2 Week Plans are no longer required. The cost of preparing and performing the recovery plan shall be borne solely by the Contractor. No approval or consent by the Owner of any plan for resequencing or acceleration of the Work submitted by Contractor shall constitute a waiver by Owner of any damages or losses which the Owner may suffer by reason of such resequencing or the failure of the Contractor to meet the Substantial Completion Date or the final completion date.
- § 3.10.9 The Contractor specifically represents and warrants to the Owner that that the Contract Sum and the Contract Time contemplate compliance with all current, and reasonably foreseeable future, federal, state and local "Stay at Home," "Social Distancing" and related orders, regulations and guidance related to limiting the spread of COVID-19 disease (the "COVID Requirements"). Accordingly, the Contractor hereby waives any claim for an increase in the Contract Sum or an extension of the Contract Time on account of the COVID Requirements. The Contractor shall promptly notify the Owner of any COVID Requirements that would impact the Project.
- § 3.10.10 Due to the ongoing COVID-19 pandemic and the resulting uncertainty with regard to, among other things, (a) what restrictions, if any, will be applicable to construction activities due to federal, state or local orders, laws, regulations or rules related to the COVID-19 pandemic (including, without limitation, social distancing, PPE, cleaning and disinfection requirements) and (b) the duration of any restrictions imposed on construction activities, the Owner

may modify the schedule set forth in the Contract Documents and the Project Schedule. Similarly, restrictions, if any, that will be or are applicable to construction activities due to federal, state or local orders, laws, regulations or rules related to the COVID-19 pandemic (including, without limitation, social distancing, PPE, cleaning and disinfection requirements) may cause the Owner to have the Work or the Project commence later than the date specified in the Contract Documents. The Contractor acknowledges and agrees that there should be no additional compensation paid for schedule modifications caused directly or indirectly by the COVID-19 pandemic. The Contractor further acknowledges and agrees that its sole remedy for any schedule modifications or delays caused directly or indirectly by the COVID-19 pandemic shall be an extension of the Contract Time, if warranted. The Contractor further acknowledges and agrees that it shall have on file and provide a copy to the Owner of its written COVID-19 business reopening plan, and it shall comply in all respects with such plan for the duration of the Project. The Contractor, not the Owner, shall be responsible for compliance with its COVID-19 business reopening plan and all safety requirements associated with COVID-19 protections for workers and the general public.

§ 3.11 Documents and Samples at the Site

§ 3.11.1 The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These documents shall be available to the Architect and delivered to the Construction Manager for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.11.2 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 structural changes in the design; and (vi) such other information as either the Owner or Architect may reasonably request. At the completion of the work, the 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 righthand 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 As-Built drawings receive the approval from the Architect and the Owner (and all other closeout requirements are met).

§ 3.11.3 The Contractor shall maintain all approved permit drawings in a manner so as to make them accessible to government inspectors and other authorized agencies having jurisdiction over the Project. All approved drawings shall be wrapped, marked and delivered to the Owner within 60 days of final completion of the Contractor's Work.

§ 3.12 Shop Drawings, Product Data, and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work. Each submittal shall bear written confirmation that the Contractor has satisfied its obligations under the Contract Documents with respect to the Contractor's review and approval of the submittal. The Contractor shall comply with the provisions and procedures for Shop Drawings, Product Data, and Samples set forth in the Project Manual, including Specifications Section 013300, "Submittal Requirements."

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

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

- § 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to (1) demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents, and (2) show a system or product's ability to meet applicable criteria for those portions of the Work for which the Contract Documents require submittals. Review by the Architect and Construction Manager is subject to the limitations of Sections 4.2.10 through 4.2.12. Informational submittals upon which the Construction Manager and Architect are not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Construction Manager or Architect without action.
- § 3.12.4.1 Shop drawings and product submittals for all site improvement, architectural, structural, mechanical, electrical and signal work shall be submitted to the Architect for its review. Refer to Contract (General, Supplementary and other conditions) Section on "Submittal Requirements" for more complete information.
- § 3.12.4.2 The Contractor represents and warrants that all shop drawings shall be prepared by a person or entity possessing expertise and experience in the trade for which the shop drawing has been prepared and, if required by the Contract Documents or law, by a licensed professional engineer.
- § 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, with copies to the Construction Manager, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the Project submittal schedule approved by the Construction Manager and Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of other Contractors, Separate Contractors, or the Owner's own forces. The Contractor shall cooperate with the Construction Manager in the coordination of the Contractor's Shop Drawings, Product Data, Samples, and similar submittals with related documents submitted by other Contractors.
- § 3.12.5.1 No extension of time will be granted to the Contractor because of failure to have shop drawings, product data, and samples submitted in ample time to allow for review by the Architect or its consultants.
- § 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner, Construction Manager, and Architect, that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. The Contractor shall be responsible for verification of field dimensions and conditions and shall furnish such information to the Architect when requested. Before the Contractor proceeds with the Work in question, the Contractor should field verify all dimensions. In case of doubt about dimensions, the Contractor should notify the Architect immediately for instructions.
- § 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been reviewed and approved by the Architect. Resubmission of rejected documents shall be performed within 10 calendar days, or sooner if required by the progress of construction. No claim for delay or cost shall be accepted as a result of rejected submittal documents. 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.
- § 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Construction Manager and Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.
- § 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Construction Manager and Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to

such revisions. 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.

- § 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.
- § 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
- § 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Construction Manager and Architect at the time and in the form specified by the Architect.
- § 3.12.11 The Architect's review of the Contractor's submittals will be limited to examination of an initial submittal and one resubmittal. The Owner is entitled to obtain reimbursement from the Contractor for amounts paid to the Architect for evaluation of additional resubmittals.
- § 3.12.12 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 shall 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.
- § 3.12.13 All shop drawings for any architectural, structural, mechanical or electrical work must be submitted to the Architect through the Construction Manager. The Contractor represents and warrants that all shop drawings shall be 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.
- § 3.12.13.1 Each shop drawing shall contain a title block with provisions for the following:
 - (1) Number and Title of Drawing.
 - (2) Date of Drawing or Revision.
 - (3) Name of Project.
 - (4) Name of Contractor or Sub-contractor submitting Drawing.
 - (5) Specification Section Title and Number.
 - (6) Space for Architect's Stamp and Received Stamps.
- § 3.12.13.2 Each shop drawing shall have listed on it all Contract Reference Drawing Numbers plus Shop Drawing Numbers on related work by other Sub-contractors if available.

- § 3.12.13.3 Each shop drawing submission cover sheet shall indicate the number of times the submittal has been submitted (e.g., whether first, second, third, etc.).
- § 3.12.13.4 Shop drawings for work of one trade shall be checked by Sub-contractors of related trades, and shall have received their stamp of approval before being submitted to the Architect, through the Construction Manager.
- § 3.12.13.5 Each shop drawing submission after the first submission shall be clear of all previous stamps.
- § 3.12.14 Contractor shall communicate and supply Shop Drawings to other Contractors to ensure proper coordination.

§ 3.13 Use of Site

- § 3.13.1 The Owner shall not be liable to the Contractor, subcontractors of any tier, suppliers, their employees or anyone else with respect to the condition of the Project site. The Owner shall have the right to refuse admittance to the site to any agent or employee of the Contractor, its subcontractors of any tier, or its suppliers whose presence the Owner deems hostile to the Owner's interests. The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment. The use of the Owner's assets and property are extremely limited. The Contractor shall fully comprehend the intent of the Contract Documents pertaining to site and building limitations including, without limitation, Division 1 Specifications sections, the phased construction plan, and the site safety and logistics plan(s).
- § 3.13.2 The Contractor shall coordinate the Contractor's operations with, and secure the approval of, the Construction Manager before using any portion of the site.
- § 3.13.3 The Contractor shall perform and shall ensure that all Subcontractors and suppliers perform all Work in a manner that permits reasonable access to the Project site and to all adjacent premises. The Contractor shall not, and shall not permit any Subcontractor or supplier to, conduct the Work in a manner that disturbs or that could be reasonably anticipated to disturb operations and persons located in or on portions of the site not affected by the Work. The occupied portion of any of the Owner's buildings shall always comply with the minimum requirements necessary to maintain a certificate of occupancy.
- § 3.13.4 Construction Rules and Regulations. The following rules and regulations shall be observed and enforced by all Contractors in connection with all phases of the Work:
 - In accordance with New York State law, smoking is prohibited anywhere on school property. Violators will be subject to arrest and/or fine of \$1,000 per occurrence. No alcoholic beverages or controlled substances are permitted on school property, and persons under the influence of alcoholic beverages or controlled substances may not enter in or remain on school property.
 - In accordance with the United States Gun-Free School Zones Act of 1994, no firearms are permitted within 1,000 feet of any school building, with certain limited exceptions as set forth therein. In addition to such limitations, no firearms shall be brought on school property without the Owner's express prior
 - Appropriate protective gear (hard hats, safety shoes, goggles, etc.) are to be worn as required by OSHA standards, the New York State Department of Labor, and prudent practice. Shirts are to be worn at all times. No short pants are permitted.
 - Any person who uses inappropriate language, or who is disruptive to the school environment, will be banned from the site.
 - .5 The Contractor's personnel shall not converse with school employees, students and or local residents.
 - .6 All persons on the Project site will comply with all reasonable instructions regarding conduct and safety which are given by the Architect, the Construction Manager or the Owner's school administrators.
 - .7 All construction materials shall be stored in a safe and secure manner. No deliveries will be allowed during school bus drop off or pick up hours as determined by the Owner. 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 the 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.
- .8 Use of the existing building facilities during construction is prohibited, specifically including toilet rooms, telephones and water fountains.
- .9 The Contractor's schedule shall allow for blackout dates during which no noisy Work will be allowed, as determined by the Construction Manager. The Contractor may consult the Owner's school calendar for all test and examination dates, but these dates are subject to change.
- To gain access to the Work, entrances and parking areas will be designated by the Owner for the Contractor's use. Any vehicles or trucks in non-designated areas may be towed at the Contractor's expense. Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.
- .11 Should it become necessary to obtain access to the existing building during construction hours for measurements or other non-disruptive work, the Contractor shall be escorted by the Construction Manager.
- All persons must wear photo identification badges at all times while working at the site. Identification badges must be provided by the Contractor for its personnel, including subcontractors, consultants, visitors and others.
- .13 No asbestos containing products are to be used anywhere on this Project.
- .14 No lead containing products are to be used anywhere on this Project.
- .15 Asbestos manifests showing the locations of all known asbestos bearing materials are available in each building, and should be consulted prior to the commencement of any work, including but not limited to demolition.
- .16 Demolition is to occur only when the building is unoccupied. Dust partitions and negative air are to be installed prior to commencing demolition. The Contractor must obtain Construction Manager approval on dust partitions and negative air prior to commencing demolition work. Debris shall be removed by using an enclosed chute or similar sealed system.
- .17 (a) Prior to the commencement of Work, the Contractor must submit construction plans, which show the location of dust particles, exhaust & fresh air fans and describe in detail the operation procedures during demolition and construction which may generate dust.
 - (b) All entrances to classrooms shall be sealed with at least 6 mil. polyethylene sheeting to prevent dust created by demolition and construction work from entering the classrooms. Entrances and egress to the work zone shall be covered with a triple flap 6 mil. polyethylene doorway to allow access to the area without the release of dust. The Contractor is, additionally, responsible for all debris and dust infiltrating adjacent and undisturbed areas of the building.
 - (c) Shut down and lock out all electrical and HVAC in the work area. Cut, cap, and seal all duct work where it enters the work area from another space. All duct work and conduit within the space shall be removed during demolition work.
 - (d) The Contractor shall install dust protection barriers and poly sheeting. There shall be no or minimum damage to adjacent surfaces. The Contractor is responsible to repair any damage to existing surfaces.
- Painting or other chemical applications shall be done in the Owner's existing building only when it is unoccupied. Storage of chemicals and painting shall be outside the Owner's existing or new structures, and shall follow manufacturer's storage guidelines.
- .19 Oxygen or other gas containers shall be properly stored and secured per OSHA requirements, to the satisfaction of the Construction Manager. Failure to do so will result in a \$250 back-charge, per occurrence.
- .20 The Contractor is responsible for cleaning its own materials and debris. Failure to maintain a clean work site daily will result in others performing the work at the Owner's request, and the Contractor will be backcharged for the cleaning cost plus construction administration fees. This may be done without the typical 3-day notice to the Contractor.
- .21 The Contractor must send a qualified representative, knowledgeable in the Project and authorized to make decisions on behalf of the Contractor, to every Project meeting.
- .22 The Contractor shall cooperate with the Owner's school principal and custodial staff; however, if any additional work is requested the Contractor shall not proceed unless written approval is received from the Owner. The Contractor will not be compensated for any additional work performed without the Owner's prior written approval.

User Notes:

- Deliveries sent to the Project site 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.
- .24 The General Construction Contractor shall be responsible for managing dust and dirt. On the exterior, site shall be watered down frequently to prevent dust clouds from rising. Streets shall be maintained clean per the Construction Manager's request.
- .25 All hot tar roofing shall be installed after school hours or on weekends/holidays only. Kettles shall not be lit until all students have left the Owner's building.
- .26 The Contractor shall submit a weekly work schedule indicating workdays, work hours and manpower allocation.
- No storage of materials will be permitted within the Owner's buildings at any time during construction. The Contractor must provide exterior storage containers when required. The Contractor shall be responsible for securing appropriate space for its material with the Construction Manager prior to delivery. Final location of storage containers shall be determined by the Owner and/or Construction Manager. 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.
- .28 The General Construction Contractor shall be responsible for maintaining all appropriate site safety signage.
- .29 The Contractor shall be responsible for protecting the Owner's property. All existing shrubs, trees, lawn fixtures, sculptures and miscellaneous equipment shall be protected at all times. Any removals or relocation of said objects, if allowed shall be as directed by the Owner in writing.
- 30 The General Construction Contractor shall provide and service portable lavatories for the duration of construction as provided in the Contract Documents. Lavatories shall be serviced by the General Construction Contractor on a regular basis to maintain sanitary conditions.
- .31 The General Construction Contractor shall protect all existing roofs during construction and shall be responsible for any damage to roofs during construction. The General Construction Contractor shall make all repairs to any damaged areas, as required by the manufacturer of the roof system.
- .32 The General Construction Contractor shall be responsible for providing weather-proof protection over all rough openings, including windows.
- .33 The Contractor shall be responsible for conducting pre-construction walk-throughs and videotaping existing 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.
- Manufacturers Material Safety Data Sheets (MSDS) shall be available at the site for all products used in the Project.
- No weapons are permitted on the Owner's property by law.
- .36 Neither the Contractor nor any person on its behalf shall, in any manner, engage in discrimination, intimidation or harassment of any person on the Project site.
- .37 Proper attire is required for personal safety and clothing must not sexually explicit or contain messages of a vulgar nature, disrespectful of ethnic or religious groups, or which promote the use of tobacco, alcohol or drugs.
- Only materials and equipment that are to be used directly in the Work shall be brought to and stored on the Project site by the Contractor. After equipment is no longer required for the Work, it shall be promptly removed from the Project site. Protection of construction materials and equipment stored at the Project site from weather, theft, damage, and all other adversity is solely the responsibility of the Contractor.
- access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work will be performed in such a manner that public areas adjacent to the site of the Work will be free from all debris, building materials and equipment likely to cause hazardous conditions. Without limitation of any other provision of the Contract Documents, the Contractor will use its best efforts to minimize any interference with the occupancy or beneficial use of (1) any areas and buildings adjacent to the site of

- the Work; or (2) the Owner's building in the event of partial occupancy, as more specifically described in Section 9.9.
- .40 The Contractor is required to protect its own Work and work areas, preconstruction, during construction and post construction.
- 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.
- The Contractor shall exert utmost care and diligence when working in or near any existing buildings or site work. 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 due to the actions or inactions of the Contractor shall be repaired by and charged to the Contractor.
- .43 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.
- The General Construction Contractor shall provide necessary and required security measures to adequately safeguard the construction site from vandalism and intrusion of unauthorized persons. The General Construction Contractor shall submit its means and methods of security to the Construction Manager for review and comment. The Project site 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 General Construction Contractor 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 General Construction Contractor. 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.
- The Contractor and any entity for which the Contractor is responsible shall not erect any sign on the Project site without the written consent of the Owner, which may be withheld in the sole discretion of the Owner.
- .46 Without limitation of any other provision of the Contract Documents, the Contractor will comply with all reasonable rules and regulations promulgated by the Owner or Construction Manager in connection with the use and occupancy of the Project site and the buildings, as amended from time to time by the Owner or the Construction Manager.
- § 3.13.5 Only materials and equipment that are to be used directly in the Work shall be brought to and stored on the Project site by the Contractor. After equipment is no longer required for the Work, it shall be promptly removed from the Project site. Protection of construction materials and equipment stored at the Project site from weather, theft, damage, and all other adversity is solely the responsibility of the Contractor.
- § 3.13.6 The Contractor shall ensure that the Work, at all times, is performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work will be performed in such a manner that public areas adjacent to the site of the Work will be free from all debris, building materials and equipment likely to cause hazardous conditions. Without limitation of any other provision of the Contract Documents, the Contractor shall use its best efforts to minimize any interference with the occupancy or beneficial use of (1) any areas and buildings adjacent to the site of the Work; or (2) the building in the event of partial occupancy, as more specifically described in Section 9.9.
- § 3.13.7 The Contractor shall not permit any workers to use any existing facilities at the Project site, including without limitation, lavatories and toilets. To gain access to the Work, entrances and parking areas will be designated by the Owner for the Contractor's use. Without limitation of any other provision of the Contract Documents, the Contractor will comply with all reasonable rules and regulations promulgated by the Owner in connection with the use and occupancy of the Project site and the Owner's building(s), as amended from time to time by the Owner.
- § 3.13.8 Construction areas that are under the control of the Contractor and therefore not occupied by the Owner's 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 Owner's building(s). 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.

§ 3.13.9 Prior to starting Work, the Contractor shall submit a written report to the Owner, Construction Manager and Architect identifying existing damage to roads, walks, lawns, buildings and other property to be affected by this Contract. Failure to submit the report shall render the Contractor responsible for existing damage. The Contractor may request and schedule an inspection with the Owner, Construction Manager and Architect prior to submittal of the report. The Contractor shall obtain the consent of adjoining property owners regarding temporary easements of any other manner of physical encroachment.

§ 3.14 Cutting and Patching

- § 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.
- § 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner, Separate Contractors, or of other Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner, Separate Contractors, or by other Contractors except with written consent of the Construction Manager, Owner, and such other Contractors or Separate Contractors. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Separate Contractors, other Contractors, or the Owner, its consent to cutting or otherwise altering the Work.
- § 3.14.3 The word "new" used herein shall mean Work which has been or is to be installed under the terms of the Contract for this Project. The word "existing" used herein shall mean existing conditions previous to the award of a Contract for this Project. In order to eliminate cutting and patching as much as possible, the Contractor shall, during the progress of its Work, provide and set proper sleeves, inserts, and other fixtures as required for its new Work and shall give proper and detailed instructions to others where the Work may be affected by their work, with adequate notice prior to the erection of new Work. Cutting and patching work as required to install new Work or remove existing work shall be done carefully and neatly with as little damage as possible. The Contractor shall refer to the Specifications for proper cutting and patching requirements. Any costs caused by defective or ill-timed Work of the Contractor shall be borne by the Contractor. Cutting and patching of any Work shall be made in such a manner as to not breach any provisions of any guaranty or warranty on existing work left in place or any guaranty or warranty required for the Contractor's new Work. Patching of work shall match existing adjacent surfaces and patchwork shall be disguised completely to hide any trace of patching. All new Work on existing roofs must be provided by a company specializing in performing the Work and approved by the existing roofing material manufacturer. It shall be the responsibility of the Contractor performing the cutting and patching to maintain any existing roofing warranty.
- § 3.14.4 Only trades persons skilled and experienced in cutting and patching shall perform such work.

§ 3.15 Cleaning Up

- § 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. On a daily basis, the 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. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project. The Contractor shall completely clean the site of the Work, removing and disposing of all construction-related debris and rubbish, and cleaning all Work-related stains, spots, marks, dirt, mortar smears, plaster smears, paint smears, caulking smears, and other foreign materials from exposed surfaces inside and outside the Owner's buildings and within the Project limit lines.
- § 3.15.1.1 All Contractor's work areas shall be kept clean each day, of refuse, including containers, cups and the like. The facilities will remain in operation during the course of the entire construction operation. All Contractors performing work on this Contract shall schedule their work so as not to interfere with any traffic to and from the required areas of use. The Contractor shall be responsible for maintaining all traffic and shall provide all barriers and protection as required to safeguard the work and the public and the occupants of the building during construction. The

Prime Contractors shall comply with all fire code regulations during construction. They include vehicular parking, smoke partitions, rescue window obstructions, use of extension cords. The fire code is available for reference at the Buildings and Grounds office.

§ 3.15.1.2 Each Contractor shall be responsible for cleaning their rubbish daily and removing all rubbish from the interior and exterior site weekly or when otherwise requested by the Owner. The General Contractor shall broom sweep all construction areas at least every Friday. Surfaces shall be left clean of mortar and paint spots and the like. The Contractor shall work in a condition approved by the Construction Manager. An inspection will occur on Friday afternoon and failure to properly clean will result in the Owner engaging a cleaning company each time the requirement is not met, without prior notification to the Contractor.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner, or Construction Manager with the Owner's approval, may do so and the Owner shall be entitled to reimbursement from the Contractor. At its option, the Owner may deduct the cost of clean-up pursuant to this Section 3.15.2 from any payments otherwise due to the Contractor pursuant to this Contract.

§ 3.15.3 Final Cleaning

- General: General cleaning during construction is required by the General Conditions and included in Division 01.
- Final Cleaning: Clean each surface or unit to the condition expected in normal commercial building cleaning. Comply with manufacturer instructions. Complete the following cleaning operations before requesting inspection for Certificate of Substantial Completion.
 - 1. Clean transparent materials including glass in doors windows. Replace any damaged glass.
 - 2. Clean exposed finishes to a dust free condition, free of stains, films, fingerprints and similar foreign substances. Clean floors as recommended by the manufacturers if new, if existing carpeted floors shall be vacuumed and wood, ceramic tile and vinyl tile floor floors shall be mopped.
 - 3. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
- Removal of Protection: Remove temporary protection and facilities installed for protection of work during construction unless otherwise directed by the Owner, Architect or Construction Manager.
- Compliance: Comply with authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

§ 3.16 Access to Work

The Contractor shall provide the Owner, Construction Manager, and Architect with access to the Work in preparation and progress wherever located. Federal, state, and local agencies with jurisdiction over the Project shall at all times have access to the Work wherever it is in preparation or progress. The Contractor shall provide for such access so that such agencies may perform their functions. The Contactor shall also allow access for all required tests and inspections.

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall, and cause its Subcontractors to, defend, indemnify and hold harmless the Owner, Construction Manager, Architect, the State of New York and their consultants, officers, directors, Cooperative Board members, agents and employees of any of them (collectively, "Indemnitees," individually, "Indemnitee") from and against all losses, damages, liabilities, actions, causes of action, claims, demands, fines, penalties, judgments, costs (including but not limited to attorneys' fees and expenses incurred in connection therewith and in the enforcement of this indemnification), charges, expenses and demands of whatever

kind in connection with or arising from or out of (a) any negligent, willful or wrongful act or omission resulting in bodily injury (including death), personal injury or property damage (including loss of use) by the Contractor, its Subcontractors, Suppliers, their respective officers, employees, servants, agents, suppliers, invitees, successors and assigns (collectively, "Contractor Parties," and individually, "Contractor Party"), (b) performance of or failure to perform the Work or any breach of this Contract or infringement of any patent right by any Contractor Party, or (c) any statutorily imposed liability for injury to employees or failure to comply with any laws or regulations affecting the Work, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Nothing contained herein shall be construed to obligate the Contractor to indemnify, defend, and hold an Indemnitee harmless for claims caused solely by the Indemnitee's negligent acts or omissions. The State of New York is an Indemnitee if New York State funding, excluding SED state building aid, is used for this Project.

The Contractor agrees to include the following indemnity provision in each and every contract it enters into with a Subcontractor, and to require that Subcontractor to include such provision in each contract it enters into with any lower tier Sub-subcontractor: "To the fullest extent permitted by law, sub-contractor shall defend, indemnify and hold harmless the Contractor, the State of New York, Owner, Owner's Consultants, Construction Manager's and Architect's consultants, and each of their respective representatives, Cooperative Board members, employees, directors, officers, and agents, from and against any and all claims, suits, actions, damages, losses, fines, penalties, costs, charges and expenses, including but not limited to attorneys' fees and the costs of any proceeding, arising out of or resulting from any performance of or failure to perform the Work, acts or omissions of the Subcontractor, its lower-tier Sub-subcontractors, and others for whom the Subcontractor is responsible, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or economic losses or damages, damage to or destruction of property, and for environmental damage, or to injury to or destruction of tangible property and nuisance, but only to the extent caused by the acts or omissions or a breach of contract of the a Subcontractor, a Sub-Subcontractor to Subcontractor, and any person or entity directly or indirectly employed by them or any person or entity 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."

- § 3.18.1.1 The Owner's right to indemnification shall in no way be diminished, waived or discharged by the exercise of any other remedy provided by the Contract Documents or by law.
- § 3.18.1.2 The Owner may withhold from an offending Contractor's Contract Sum an amount sufficient to cover any damages sustained by person or entity indemnified by the Contractor pursuant to this Section 3.18 and all expenses and costs associated with the damage sustained.
- § 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- § 3.18.8.1 Whenever any party to the Contract is required in words or substance to indemnify or hold harmless another party, whether or not the following is expressly included in whole or in part in the paragraph or section with regard to such particular indemnification and hold harmless provision, such indemnification and hold harmless provision shall include, but not be limited to, the payment or reimbursement of all judgments, claims, damages, losses, fees costs and expenses and litigation costs and expenses, including but not limited to, the reasonable fees of its attorneys and witnesses.
- § 3.18.8.2 Whenever the Contractor is required in this Section 3.18 or any other provision of the Contract Documents to defend the Owner, the Owner's Cooperative Board, the Architect, or the Construction Manager or their respective consultants, officers, directors, officials, employees, servants and agents (the "Indemnitees") against any claim, action, or proceeding, in the event the Contractor shall fail or refuse to defend any one or more of the Indemnitees, the Contractor shall be liable to such Indemnitee for all costs such Indemnitee incurs in defending such claim, action or proceeding and all costs of such Indemnitee, including attorneys' fees, incurred to recover such defense costs from the Contractor.
- § 3.18.3 The Contractor's defense and indemnity obligations under this Section 3.18 shall specifically include all claims and judgments that may be made against the Indemnitees under the Labor Law of the State of New York, and

similar laws of other state or governmental bodies having jurisdiction; and further, against claims and judgments arising from violation of public ordinances and requirements of governing execution of the Work.

- § 3.18.4 Claims by Governmental Authorities. To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Indemnitees from and against claims, damages, losses, and expenses arising out of any claims made against the Indemnitees under the laws of federal, state, or other governmental bodies having jurisdiction over the Work, including but not limited to claims arising from violation of public ordinances and other requirements of governing authorities, due to the Contractor's method of execution of the Work or implementation of any of the Contractor's other obligations under the Contract Documents.
- § 3.18.5 Liens and Security Interests. To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Indemnitees from and against any actions, lawsuits, or other proceedings brought against Indemnitees as a result of liens or security interests of any type arising from the Work and filed against the Work, the site of any of the Work, the Project site and any improvements thereon, payments due the Contractor, or any portion of the property of any of the Indemnitees.
- § 3.18.6 Intellectual Property. The Contractor shall defend, indemnify, and hold harmless the Indemnitees from and against any claim or demand for patent fees, royalties, or otherwise on account of any invention, machine, article, process, copyright, or arrangement that may be used by the Contractor in performing the Work, other than as to any of the foregoing expressly called for in the Contract Documents to be so used. In the event of any injunction or legal action regarding such claim or demand that results in stopping the Work in whole or part, the Owner shall have the right to direct the Contractor to change the manner of performance of the Work to avoid such stoppage, all cost and expense occasioned thereby to be borne solely by the Contractor.
- § 3.18.7 The Contractor shall further indemnify and hold harmless the Indemnitees from and against any costs and expenses (including reasonable attorneys' fees) incurred by any of the Indemnitees in enforcing any of the Contractor's defense, indemnity, and hold harmless obligations under this Section 3.18 or as may otherwise be provided elsewhere in the Contract.
- § 3.18.8 Subject to Section 3.18.9, all obligations of the Contractor under this Section 3.18 to defend the Indemnitees are obligations to provide full defenses at the sole cost and expense of the Contractor, regardless of any alleged culpability on the part of any Indemnitee or any ultimate determination of relative shares of liability of any Indemnitee or limitation of the Contractor's indemnity obligations in light of such determination.
- § 3.18.9 To the extent any defense, indemnity, or hold harmless obligations under this Section 3.18 are made void or otherwise impaired by any law controlling their construction (including but not limited to laws limiting such obligations to the extent of the portion of damages caused by an indemnitor), such obligations shall be deemed to conform to the greatest rights to defense and indemnity permitted by such law (including but not limited to New York State General Obligations Law Section 5-322.1).
- § 3.18.10 All provisions of this Section 3.18 shall survive termination of the Agreement or final completion. No obligations under this Section 3.18 shall be construed to negate, abridge, or reduce other rights or obligations to defense and indemnity, including but not limited to common law indemnity, which would otherwise exist as to a party or person described in this Section 3.18.

§ 3.19 Existing Features and Underground Data

- § 3.19.1 The location of existing features shown on plans is intended for general information only. The Contractor, alone, is responsible for accurate determination of the location of all structures, and shall not be entitled to any increase in the Contract Sum or Contract Time due to difficulties or distances encountered in the Work, which should have been foreseeable thereby.
- § 3.19.2 The locations, depths and data as to underground conditions have been obtained from records, surface indications and data furnished by others. Information furnished is solely for the convenience of the Contractor without any warranty, expressed or implied as to its accuracy or completeness. The Contractor shall make no claim against the Owner, Construction Manager or Architect with respect to the accuracy or completeness of such information if it is erroneous, or if the conditions found at the time of construction are different from those as indicated.

§ 3.20 Construction Stresses

- § 3.20.1 The Contractor shall be solely responsible for the conditions which develop during construction and in the event any structure is dislocated, over strained, or damaged so as to affect its usefulness, the Contractor shall be solely responsible. The Contractor shall, at its own expense, take whatever steps necessary to strengthen, relocate, or rebuild the structure to meet all applicable requirements.
- § 3.20.2 The Contractor is responsible for restoration or repair of utilities, private property, buildings, pavement, walkways, roads, or other property damaged by its activities under this Agreement.

§ 3.21 Training and Instructions

§ 3.21.1 Upon Substantial Completion of the Work, the Contractor shall orient and instruct personnel of the Owner designated by it in the operation and maintenance of all equipment furnished by the Contractor and shall turn over all pertinent literature and operational manuals relating to the equipment. The format for organizing, binding, and delivering such manuals shall be as described in the Specifications.

§ 3.22 Daily Records Clause

- § 3.22.1 The Contractor shall prepare and maintain Daily Inspection Records to document the progress of the work on a daily basis. Such daily records shall include a daily accounting of all labor and all equipment on the site for the Contractor and all subcontractors, at any tier. Such daily records will make a clear distinction between work being performed under Change Order, base scope work and/or disputed work.
- § 3.22.2 In the event that any labor or equipment is idled the daily records shall record which laborers and equipment were idled, for how long and the reason such labor or equipment was idle. In the event that specific work activities were stopped, solely as a result of Owner, Construction Manager or Architect actions or inactions, and labor and equipment was reassigned to perform work on other activities, the daily records will make a clear record of which activities were stopped and where labor and equipment was redirected to.
- § 3.22.3 Such daily records shall be copied and provided to the Owner through the Construction Manager at the end of every week.

ARTICLE 4 ARCHITECT AND CONSTRUCTION MANAGER

§ 4.1 General

- § 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.
- § 4.1.1.1 Architect's Consultants: All firms listed on the title sheet of the Specifications, except for the Owner and Construction Manager, are Consultants employed by the Architect, and are agents of the Architect and will make observation of their respective branches of the Work. All changes in the Work must be processed through the Architect. Consultants shall not order extra Work or make changes in the Work.
- § 4.1.2 The Construction Manager is the person or entity retained by the Owner pursuant to Section 2.3.3 and identified as such in the Agreement.
- § 4.1.3 The Architect is the interpreter of the technical requirements of the Drawings and Specifications with regard to questions the Contractor may have concerning its obligations under either. The Architect shall render such interpretations with such promptness as necessary to maintain progress of the Work.

§ 4.2 Administration of the Contract

- § 4.2.1 The Construction Manager and Architect will provide administration of the Contract as described in the Contract Documents and will be the Owner's representatives during construction until the date the Architect issues the final Certificate for Payment and during the correction period described in Article 12. The Construction Manager and Architect have the authority to act on behalf of the Owner only to the extent provided in the Contract Documents.
- § 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make

exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of the site visits, the Architect will keep the Owner and the Construction Manager reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner and Construction Manager known deviations from the Contract Documents and defects and deficiencies observed in the Work.

- § 4.2.3 The Construction Manager shall provide one or more representatives who shall be in attendance at the Project site whenever the Work is being performed. The Construction Manager will determine in general if the Work observed is being performed in accordance with the Contract Documents, will keep the Owner and Architect reasonably informed of the progress of the Work, and will promptly report to the Owner and Architect known deviations from the Contract Documents and the most recent Project schedule, and defects and deficiencies observed in the Work.
- § 4.2.4 The Construction Manager will schedule and coordinate the activities of the Contractor and other Multiple Prime Contractors in accordance with the latest approved Project Schedule. The Contractor shall participate with other Contractors and the Construction Manager, the Architect and Owner in reviewing their construction schedules when directed to do so. The Contractor shall make any revisions to the construction schedule deemed necessary by the Owner or Construction Manager. The approved construction schedules shall be integrated into the Project Schedule and constitute the schedules to be used by the Contractor, other Contractors, the Architect, the Construction Manager and the Owner until subsequently revised.
- § 4.2.4.1 The Contractor shall assume full responsibility for the execution of its Work in the allotted duration times set forth in the Project Schedule.
- § 4.2.5 The Construction Manager, except to the extent required by Section 4.2.4, and Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, and neither will be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. Neither the Construction Manager nor the Architect will have control over or charge of or be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or of any other persons or entities performing portions of the Work.
- § 4.2.6 Communications Facilitating Contract Administration. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Construction Manager, and shall contemporaneously provide the same communications to the Architect about matters arising out of or relating to the Contract Documents. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with other Multiple Prime Contractors shall be through the Construction Manager and shall be contemporaneously provided to the Architect if those communications are about matters arising out of or related to the Contract Documents. Communications by and with the Owner's own forces shall be through the Owner.
- § 4.2.7 The Construction Manager and Architect will review and certify all Applications for Payment by the Contractor, in accordance with the provisions of Article 9. The Construction Manager will assemble each of the Contractor's Applications for Payment with similar applications from other Prime Contractors into a Project Application and Certificate for Payment, all of which will be submitted to the Architect with the Construction Manager's recommendations as to certifications in whole or part by the Architect.
- § 4.2.8 The Architect and Construction Manager have authority to reject Work that does not conform to the Contract Documents and will notify each other about the rejection. The Construction Manager shall determine in general whether the Work of the Contractor is being performed in accordance with the requirements of the Contract Documents and notify the Owner, Contractor and Architect of defects and deficiencies in the Work. Whenever the Construction Manager considers it necessary or advisable, the Construction Manager will have authority to require additional inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, upon written authorization of the Owner, whether or not such Work is fabricated, installed or completed. The foregoing authority of the Construction Manager will be subject to the provisions of Sections 4.2.18 through 4.2.20 inclusive, with respect to interpretations and decisions of the Architect. However, neither the Architect's nor the Construction Manager's authority to act under this Section 4.2.8 nor a decision made by either of them in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Construction Manager to the

Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons performing any of the Work.

- § 4.2.9 The Construction Manager will receive and promptly transmit to the Architect all submittals from the Contractor such as Shop Drawings, Product Data and Samples. The Construction Manager's actions will be taken in accordance with the Project submittal schedule approved by the Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness while allowing sufficient time to permit adequate review by the Architect.
- § 4.2.10 The Architect will review and approve or take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Upon the Architect's completed review, the Architect shall transmit its submittal review to the Construction Manager.
- § 4.2.11 Review of the Contractor's submittals by the Architect is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.
- § 4.2.11.1 The Architect's review of Contractor's submittals shall be limited to an initial submittal and one (1) resubmittal. If the Architect is required to review additional submittals because the initial submittal and resubmittal failed to conform to the information given and the design concept expressed in the Contract Documents, the amount of compensation paid to the Architect by the Owner for additional services shall be deducted from the payments to the Contractor.
- § 4.2.11.2 The review will not be considered complete until an "ACTION" stamp or other written notice to that effect has been received by the Contractor.
- § 4.2.12 The Construction Manager will prepare Change Orders and Construction Change Directives.
- § 4.2.13 The Construction Manager and the Architect will take appropriate action on Change Orders or Construction Change Directives in accordance with Article 7 and the Architect will have authority to order minor changes in the Work as provided in Section 7.4. The Architect, in consultation with the Construction Manager, will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section
- § 4.2.14 Utilizing the documents provided by the Contractor, the Construction Manager will maintain at the site for the Owner one copy of all Contract Documents, approved Shop Drawings, Product Data, Samples and similar required submittals, in good order and marked currently to record all changes and selections made during construction. These will be available to the Architect and the Contractor, and will be delivered to the Owner upon completion of the Project.
- § 4.2.15 The Construction Manager will assist the Architect in conducting inspections to determine the dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion in conjunction with the Architect pursuant to Section 9.8; and receive and forward to the Owner written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10. The Construction Manager will forward to the Architect a final Application and Certificate for Payment or final Project Application and Project Certificate for Payment upon the Contractor's compliance with the requirements of the Contract Documents.

- § 4.2.16 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.
- § 4.2.17 The Architect will interpret and decide matters concerning performance under, and requirements of the Contract Documents on written request of the Construction Manager, Owner or Contractor through the Construction Manager. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.
- § 4.2.18 Interpretations and decisions of the Architect will be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings.
- § 4.2.18.1 If Work is described or indicated in a manner which makes it impossible to carry out the requirements of the Contract Documents, or should discrepancies appear among the Contract Documents, the Contractor shall request interpretation before proceeding with the Work. If the Contractor fails to make such a request, no excuse will be entertained for failure to carry out the Work of the Contract Documents. Should a conflict occur in or between Contract Documents, the Contractor is deemed to have included in the Contract Sum the more expensive manner of doing the Work.
- § 4.2.19 The Architect's decisions, after consultation with the Owner, on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.
- § 4.2.20 The Construction Manager will receive and review requests for information from the Contractor, and forward each request for information to the Architect, with the Construction Manager's recommendation. The Architect will review and respond in writing to the Construction Manager to requests for information about the Contract Documents. The Construction Manager's recommendation and the Architect's response to each request will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

(Paragraph deleted)

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

- § 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, within ten (10) days after award of the Contract, shall furnish in writing to the Construction Manager for review by the Owner, Construction Manager and Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Construction Manager may reply within 14 days to the Contractor in writing stating (1) whether the Owner, Construction Manager or Architect has reasonable objection to any such proposed person or entity or, (2) that the Construction Manager, Architect or Owner requires additional time for review. Failure of the Construction Manager, Owner, or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.
- § 5.2.1.1 In no case shall payments be made on the Contract until a complete list of Subcontractors has been submitted by the Contractor to the Construction Manager for review by the Owner, Construction Manager, and Architect. Such list shall not be considered complete if the Owner, Construction Manager or Architect has any reasonable objection to any name listed thereon. Such list shall be submitted and resubmitted if necessary until it is considered complete.

- § 5.2.1.2 Subcontractors will not be acceptable unless, when requested by the Owner, Architect or Construction Manager, evidence is furnished by the Contractor that the proposed Subcontractor has satisfactorily completed similar subcontracts as contemplated under this Contract, and has the necessary experience, personnel, equipment, plant and financial ability to complete the proposed subcontract in accordance with the intent of the Contract Documents and the Project Schedule. As verification of financial ability, the Owner reserves the right to request and receive up to five (5) years of financial statements, bank references, bond/insurance company references and all other information required to assess financial ability.
- § 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner, Construction Manager or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.
- § 5.2.3 If the Owner, Construction Manager or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner, Construction Manager and Architect have no objection. No increase in the Contract Sum shall be allowed where a Subcontractor 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 of work of similar nature. Upon receipt of a rejection of a Subcontractor by the 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 proposed Subcontractor is qualified to perform the work. Upon review of such reasons, the Architect shall reconsider its determination and shall advise the Contractor of its determination upon such review. If the Architect still finds that such proposed Subcontractor does not meet the requirements above stated, it shall advise the Contractor. The Architect's determination upon such review shall be final and binding on the Contractor and its proposed Subcontractor and the Contractor hereby waives any and all claims it or its proposed Subcontractor might have against the Owner, the Construction Manager and the Architect concerning the rejection of such Contractor and shall require its Subcontractors to execute such similar waiver in its agreement with the Contractor.
- § 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner, Construction Manager or Architect makes reasonable objection to such substitution.
- § 5.2.5 The Maintenance of the Project Schedule is critical. The Contractor shall award subcontracts to entities capable of performing in a manner that will maintain the Project Schedule and require its subcontractors to complete their work in accordance with the Project Schedule.
- § 5.2.6 Upon written request from or on behalf of the Owner, the Contractor shall provide to the Owner executed, unredacted copies of all subcontracts, purchase orders or other agreements relating to the Work.

§ 5.3 Subcontractual Relations

§ 5.3.1 By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by the Contract Documents, assumes toward the Owner, Construction Manager and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, Construction Manager and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors. Each subcontract shall contain provision for execution of lien waivers in form and substance acceptable to the Owner as a condition of payment by the Contractor. The Contractor shall require each Subcontractor to (1) inspect the Project site, including all relevant surfaces and job conditions, before beginning the Work and (2) accept or cite necessary corrections in the Project site, including surfaces or job conditions, before beginning the Work.

§ 5.3.2 The Contractor shall promptly notify the Owner and Architect of any material defaults by any Subcontractor or whether it has terminated its agreement with any of its Subcontractors for any reason, except for sums due and owing by Contractor under the subcontract for work performed or material supplied prior to receipt of Owner's notice of its determination to accept the subcontract. Owner shall only be required to compensate the Subcontractor of an accepted subcontract for compensation accruing to such Subcontractor for Work done or materials delivered after the date on which Owner provided notice of its determination to accept the subcontract. All sums due and owing by Contractor to the Subcontractor of an accepted subcontract shall constitute a debt between the Contractor and Subcontractor.

§ 5.4 Contingent Assignment of Subcontracts

- § 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that
 - assignment is effective only after termination of the Contract by the Owner pursuant to Article 14 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
 - .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the

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

- § 5.4.2 Upon such assignment, if the Work has been suspended for more than 60 days, through no fault of the Subcontractor, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.
- § 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor Contractor or other entity.
- § 5.4.4 All subcontracts over \$10,000 shall be in writing with copies of the written subcontract provided to the Owner promptly upon request.

§ 5.5 Owner Payment to Subcontractors

- § 5.5.1 In the event of any default hereunder by the Contractor, or in the event the Owner, Construction Manager, or Architect fails to approve any application for payment, that is not the fault of a Subcontractor, the Owner may make direct payment to the Subcontractor, less appropriate retainage. In that event, the amount so paid the Subcontractor shall be deducted from any sums payable by the Owner to the Contractor.
- § 5.5.2 Nothing contained herein shall create any obligation on the part of the Owner to make any payments to any Subcontractor, and no payment by the Owner to any Subcontractor shall create any obligation to make any further payments to any Subcontractor.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

- § 6.1 Owner's Right to Perform Construction with Own Forces and to Award Other Contracts
- § 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.
- § 6.1.2 When the Owner performs construction or operations with the Owner's own forces or Separate Contractors, the Owner shall provide for coordination of such forces and Separate Contractors with the Work of the Contractor, who shall cooperate with them.
- § 6.1.3 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.1.4 The Contractor accepts assignment of, and liability for, all purchase orders and other agreements for procurement of materials and equipment that are identified as part of the Contract Documents. The Contractor shall be responsible for such pre-purchased items, if any, as if the Contractor were the original purchaser. The Contract Sum includes, without limitation, all costs and expenses in connection with delivery, storage, insurance, installation and testing of items covered in any assigned purchase orders or agreements. All warranty and correction of the Work obligations under the Contract Documents shall also apply to any pre-purchased items, unless the Contract Documents specifically provide otherwise.

§ 6.2 Mutual Responsibility

- § 6.2.1 The Contractor recognizes and acknowledges that the Project is governed by and subject to the provisions of New York State General Municipal Law §101, et seq., governing the award of contracts on public improvement projects. As such, the Contractor recognizes and acknowledges that other Contractors or Separate Contractors will be performing work on the Project in conjunction with it. As such, the Contractor shall afford the Owner's own forces and other Contractors or Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.
- § 6.2.1.1 The Contractor shall not commit or permit any act which will interfere with the performance of the work of any other Contractor or Separate Contractor performing work on the Project. If the Contractor sustains any damage through any act or omission of Separate or 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 Separate or other Contractor, the Contractor shall promptly notify the Owner and the Construction Manager of such damage
- § 6.2.1.2 To the fullest extent permitted by law, the Contractor agrees to defend, indemnify and hold harmless the Owner, Architect, Construction Manager, Consultants and Sub-consultants, from all claims made against any of them arising out of the 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, Separate Contractor or other Contractor 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 the Contractor's Contract Sum an amount sufficient to cover such damage and all expenses and costs associated with the damage sustained.
- § 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner's own forces, Separate Contractors or other Contractors, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Construction Manager and Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor or other Contractors that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Construction Manager and the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's or other Contractors' completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractors or other Contractors that are not apparent.
- § 6.2.2.1 The Contractor shall promptly correct discrepancies or defects in its Work identified by Separate Contractors as affecting proper execution and results of the work of the Separate Contractors.
- § 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs, including costs that are payable to a Separate Contractors or to other Contractors, because of the Contractor's delays, improperly timed activities or defective construction.
- § 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction, or to property of the Owner, Separate Contractors, or other Contractors as provided in Section 10.2.5 or elsewhere in the Contract Documents.
- § 6.2.5 The Owner, Separate Contractors, and other Contractors shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

- § 6.2.6 Should the Contractor or its Subcontractors cause damage to the work or property of any Separate Contractor or other Multiple Prime Contractor, the Contractor shall, upon due notice, promptly attempt to settle by agreement or otherwise resolve the dispute with the Separate Contractor or other Multiple Prime Contractor. If such separate trade contractor or other Multiple Prime Contractor sues or makes any other claim against the Owner, Construction Manager, or Architect on account of any damage alleged to have been caused by the Contractor or its Subcontractors, the Contractor shall defend, indemnify, and hold harmless the Owner, Construction Manager, and Architect against such claim or proceedings at the Contractor's own expense. 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 Documents or by law. Further, the Owner shall be entitled to withhold from the Contractor's Contract Sum an amount sufficient to cover such damage and all expenses and costs associated with the damage sustained.
- § 6.2.7 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.
- § 6.2.8 In case of interference between the operations of the Contractor and other 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.
- § 6.2.9 The Contractor, including its Subcontractors, shall keep itself informed of the progress of other Contractors and shall notify the Architect or the Construction Manager immediately in writing of lack of progress on the part of other Contractors where such delay will interfere with its own operations. Failure of the Contractor to keep informed of the work progressing on the Project and failure to give notice of lack of progress by others shall be construed as acceptance by the Contractor of the status of the work as being satisfactory for proper coordination with the Contractor's Work.
- § 6.2.10 Delays or oversights on the part of the Contractor or its Subcontractors in getting any or all of the 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 either an increase in the Contract Sum or Contract Time.
- § 6.2.11 The Contractor shall promptly correct discrepancies or defects in its Work which have been identified by Separate Contractor(s) or other Contractor(s) as affecting proper execution and results of the work of such Separate Contractor(s) or other Contractor(s).

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, other Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Construction Manager, with notice to the Architect, will allocate the cost among those responsible.

ARTICLE 7 **CHANGES IN THE WORK**

§ 7.1 General

- § 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, only by Change Order, Construction Change Directive or field order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents. The Owner may in its sole discretion reduce the scope of the Contractor's Contract with or without any specific reasons therefor.
- § 7.1.2 A Change Order shall be based upon agreement among the Owner, Construction Manager, Architect and Contractor; a Construction Change Directive requires agreement by the Owner, Construction Manager and Architect and may or may not be agreed to by the Contractor; a field order for a minor change in the Work may be issued by the Architect alone.
- § 7.1.2.1 Field orders are an interpretation of the Drawings or Specifications which order minor changes in the Contractor's work which will not result in an increase or decrease in the Contract Sum. From time to time, the

Architect may issue field orders to the Contractor. The work included in such field order shall be performed by the Contractor at no additional cost to the Owner and shall not form the basis for a claim for an extension of the Contract Time. 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 or Separate 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.

- § 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or field order for a minor change in the Work. Additional work performed without authorization of a Change Order will not entitle the Contractor to an increase in the Contract Sum or an extension of the Contract Time. No course of conduct or prior dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that the Owner has been unjustly enriched by any alteration or addition to the Work, whether or not there is, in fact, any unjust enrichment of the Owner, shall be the basis for any claim 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.
- § 7.1.4 Costs for changes in the Work shall not be allowed in excess of usual rentals charged in the area where the Project is located for similar equipment of like size and condition, including costs of necessary supplies and repairs for operating equipment on site in connection with other work unless its use incurs actual and additional costs to Contractor. If equipment not on Site is required for change in work only, cost of transporting equipment to and from Site will be allowed.
- § 7.1.5 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 Sub-subcontractor(s) perform in connection with additional work shall be properly itemized and supported by sufficient substantiating data, including but not limited to material descriptions, material quantities, material unit prices, labor trade listings, labor hour quantities, labor trade rates, equipment descriptions and equipment rates with a percentage allowance for overhead and profit as set forth in Section 7.3.11. The Contractor's proposal shall also set forth the impact on the milestone and critical path dates set forth in the Contract Documents, the construction schedule and the Project schedule, which would result from implementation of the change, and be accompanied by such other information as the Owner may request.
- § 7.1.6 Overtime, when specifically authorized by the Owner in writing, and not as a corrective measure by the Contractor to expedite the progress of construction as ordered by the Owner based on its determination that the performance of the Work has not progressed to the level of completion required by the approved Schedule, shall be paid for by the Owner on the basis of premium payment only, plus the cost of insurance and taxes based on the premium payment period. Overhead and profit will not be paid by the Owner for overtime.
- § 7.1.7 Unit prices shall be submitted in the Bid Form for various items as set forth therein, and are subject to approval and acceptance by the Owner. The Owner reserves the right to reject any unit price which is unreasonable or unbalanced, as compared with prevailing costs, or as compared with the unit prices submitted by other bidders for the Project. Approved unit prices quoted shall include all profit, overhead, bonds, insurance, labor, materials, equipment, tools, applicable taxes necessary to complete the work item and shall apply to all work added or work deducted.

§ 7.2 Change Orders

- § 7.2.1 A Change Order is a written instrument prepared by the Construction Manager and signed by the Owner, Construction Manager, Architect, and Contractor, stating their agreement upon all of the following:
 - The change in the Work;
 - .2 The amount of the adjustment, if any, in the Contract Sum; and
 - The extent of the adjustment, if any, in the Contract Time.

- § 7.2.1.4 Changes in the Work involving additional Work or deletion of Work effecting an addition to or subtraction from the Contract Sum shall not be made until the Contractor submits to the Architect and Construction Manager the cost of the added or deleted Work with a complete and detailed listing of all Subcontractors involved, all materials, labor, overhead and profit, the impact on the Contract Time, and an appropriate Change Order has been issued. If requested, the Contractor shall submit detailed quotations for Subcontractors and material suppliers. Changes in the Work when not involving additions or deletions from the Contract Sum shall not be made until the Architect has issued an appropriate Change Order. All Change Orders must have the approval of the Owner, Construction Manager and Architect in writing. No change in Contract Time shall be allowed for Change Orders, except for substantial changes in scope determined by the Owner. In the case of increased scope, it is expected that Change Order work shall be performed by increased manpower.
- § 7.2.2 Methods used in determining adjustments to the Contract Sum may include those listed in Section 7.3.3. The Owner shall have the right to select the method of pricing to be used by the Contractor.
- § 7.2.3 Agreement on any Change Order shall constitute a final settlement of all Claims and other matters related to the change in Work that is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change (including, without limitation, all costs of associated delay, interference, acceleration, inefficiency, overhead, as well as costs of material, labor and supervision), and any and all adjustments to the Contract Sum and the Contract Time. Payment of a Change Order shall constitute accord and satisfaction of all Claims of the Contractor in connection with the change or changes to the Contract addressed by the Change Order and it is understood and agreed that a signed Change Order shall be the complete and fully integrated agreement for all related costs and there are no oral or written understandings, reservations, representations or agreements, directly or indirectly, connected with the Change Order and not affirmatively stated on the signed Change Order. In the event a Change Order increases the Contract Sum, the Contractor shall include the Work covered by such Change Orders in Applications for Payments as if such Work were originally part of the Contract Documents.
- § 7.2.4 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:
 - Certified payrolls itemizing the labor actually utilized in connection with the Change Order work; and
 - Copies of invoices from its Subcontractors supplying work in connection with the Change Order work.
- § 7.2.5 Additional work performed without authorization of a Change Order will not entitle the Contractor to an increase in the Contract Sum or an extension of the Contract Time, except at provided in Section 7.3, and except in the case of an emergency as provided in Section 10.4.

§ 7.3 Construction Change Directives

- § 7.3.1 A Construction Change Directive is a written order prepared by the Construction Manager and signed by the Owner, Construction Manager and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.
- § 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order or to direct the Contractor to remedy its nonconforming or defective Work. In the event the Contractor and the Owner cannot agree on the sum by which the Contract Sum or the amount of time by which the Contract Time is to be increased or reduced based upon changes to the scope of the Work as described in Article 7, or due to the Contractor's failure to perform the Work in accordance with the Contract Documents, the Architect or Construction Manager shall issue a Construction Change Directive directing the Contractor to proceed with the disputed Work or correct defective Work and, if applicable, reflecting the addition to or reduction of the scope of the Contractor's Contract and the corresponding change in the Contract Sum or Contract Time, if any.
- § 7.3.2.1 If the Owner and the Contractor cannot agree that the requested Work properly forms the basis for a Change Order or on the sum by which the Contract is to be increased or reduced based upon changes to the scope of Work, the Architect or Construction Manager shall issue a Construction Change Directive signed by the Owner, Construction Manager and Architect reflecting the addition to, or removal of, the scope of Work and the Contractor shall (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 the Contractor or other Contractors working at the site and keep records of its performance

of such additional work, and (b) in the case of work to be removed from the scope of the Contractor's Work, refrain from taking any steps in connection with the work associated with the deduction of the Contractor's Work. The Construction Change Directive shall include: (a) a description of the work being added or removed from the Contractor's scope of Work; (b) the amount the Owner has determined to be the cost associated with the additional work (as those costs are identified and limited in Section 7.3.4) or removal of the scope of the Contractor's Work 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; and (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 15 of these General Conditions. Failure to timely file any claim in accordance with requirements set forth therein shall constitute a waiver of such claim.

- § 7.3.3 If the Construction Change Directive provides for a method for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:
 - .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation:
 - .2 Unit prices stated in the Contract Documents or subsequently agreed upon (unit prices shall be deemed to include all costs and expenses for the Contractor's changed Work, including costs of general conditions, insurance/bonds and overhead and profit attributable to the change);
 - .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee subject to the limitations of Section 7.3.11;
 - .4 As provided in Section 7.3.4 subject to the limitations of Section 7.3.11; or
 - .5 As provided in Section 7.3.2.1.
- § 7.3.4 If the Construction Change Directive provides for a reasonable expenditure and savings method of adjusting the Contract Sum, the Construction Manager shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in Section 7.3.11. In such case, the Contractor shall keep and present, in such form as the Construction Manager may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:
 - .1 Actual costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers compensation insurance;
 - .2 Actual costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed. Sales taxes, if any are required, shall be indicated and added after the cost of the change is calculated. No overhead or profit will be paid on sales tax;
 - .3 Actual rental costs of machinery and equipment, exclusive of hand tools, rented from third parties; and
 - .4 Actual costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the additional work. The Contractor shall submit with its proposal actual invoices from its insurance broker reflecting actual additional costs associated with the procurement of bonds and insurance. Bond premiums and/or credits shall be invoiced per Change Order. Lump sum bond premium requests will not be considered at the end of the Project.
- § 7.3.5 If the Contractor disagrees with the adjustment in the Contract Sum or Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.
- § 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Construction Manager of the Contractor's agreement or disagreement with (1) the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time or (2) the amount of the increase or decrease in the Contract Sum and Contract Time as provided in Section 7.3.2.1. Any claims must be filed in accordance with the requirements set forth in Article 15 of these General Conditions. Failure to timely file any claim in accordance with requirements set forth therein shall constitute a waiver of such claim.
- § 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

- § 7.3.8 When the Owner or Architect request that portions of the Contractor's Work originally included in the Drawings or Specifications be deleted and which will result in a reduction of the Contract Sum, the Architect shall request that the Contractor submit its proposal for deleting the scope of such Work from the Contract. The Contractor's proposal shall include a complete itemization of the costs associated with deducting such Work including labor, materials, overhead and profit. The Contractor shall not be entitled to retain its overhead 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, if any, with respect to that change.
- § 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Construction Manager and Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Construction Manager and Architect determine to be reasonably justified. The interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.
- § 7.3.10 When the Owner and Contractor agree with a determination made by the Construction Manager and Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Construction Manager shall prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.
- § 7.3.11 The limit for the combined overhead and profit included in the total cost to the Owner shall be based on the following schedule:
 - .1 For the Contractor, for Work performed by the Contractor's own forces, fifteen percent (15%) of the direct cost for labor and materials.
 - For the Contractor, for Work performed by the Contractor's Subcontractor, maximum of five percent (5%) of the amount due the Subcontractor for the Contractor's overhead and profit. For the Subcontractor, for Work performed by the Subcontractor's own forces, ten percent (10%) of the direct cost for labor and materials. The total combined overhead and profit for a change order shall be limited to 15% of the direct cost regardless if the Work is performed by the Contractor or the Subcontractor.
 - .3 The markup on any part of the Work a Subcontractor subcontracts will be limited to one overhead and profit figure, in addition to the Contractor's overhead and profit markup. The Subcontractor and Sub-subcontractor may divide the overhead and profit amount as they agree upon.
 - .4 Costs to which overhead and profit is to be applied shall be determined in accordance with Section 7.3.4.
 - .5 In order to facilitate checking of quotations for extras and credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials, and subcontracts. Labor and material shall be itemized in the manner prescribed above. Where major cost items are subcontracts, they shall be itemized also.
 - The overhead and profit mark-up includes, but is not be limited to, the following:
 - .1 home office expense;
 - .2 field office expense;
 - .3 supervision;
 - .4 project management & estimation;
 - .5 small tools & equipment;
 - .6 research & layout;
 - .7 inspections & permits;
 - .8 material handing;
 - .9 record drawings: and
 - .10 safety and cleanup

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the

Contract Sum or Contract Time, the Contractor shall notify the Construction Manager and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Construction Manager that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

- § 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.
- § 8.1.2 The date of commencement of the Work is the date established in the Agreement. The date shall not be postponed or extended by the failure to act of the Contractor or persons or entities for whom the Contractor is responsible to act.
- § 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8. The date of final completion is the date certified by the Architect and Owner in accordance with Section 9.10. Unless otherwise agreed in writing by the Owner, the Contractor agrees that Final Completion shall occur not more than 30 calendar days after the date of Substantial Completion.
- § 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.
- § 8.1.5 Work remaining to be completed after Substantial Completion, shall be limited to items which can ordinarily be completed within a thirty (30) day period (one month) before final payment is made.

§ 8.2 Progress and Completion

- § 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.
- § 8.2.1.1 The Contractor recognizes that the Project Schedule is of critical importance to the Owner and that failure by the Contractor to complete the Work in accordance with the construction schedule may cause significant damages to the Owner, including but not limited to the loss of State Aid from the State Department of Education. All aspects of construction must reflect a "time is of the essence" construction strategy. The "Bid Schedules" serve as a guide of critical milestone dates to the Project. Failure to meet intermediate milestone dates will jeopardize the overall Project Schedule. If the Contractor's performance of the Work demonstrates, to the Owner, Construction Manager or Architect, that timely completion may be in jeopardy, this will mandate the Contractor to increase staff, work overtime, or use other means to recover time, at the costs of the Contractor responsible for such delays. In addition, all costs due to delays in completion of the Work shall be borne by Contractor(s) responsible for delays.
- § 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner and the Owner's approval of such insurance. The date of commencement of the Work shall not be changed by the effective date of such insurance. The Work can not start until the required insurance and bonds are provided and the Contract has been executed.
- § 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion and final completion within the Contract Time. The Contractor agrees that the Work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will ensure full completion thereof within the Contract Time specified and, further, to provide such protections as may be necessary. It is expressly understood and agreed by the Contractor that the time for the substantial and final completion of the Work is a reasonable time for its completion, taking into consideration, among other things, the average climatic range and usual weather conditions prevailing in the Project's locality. The Contractor shall cooperate with the Owner, Architect, and other Contractors on the Project, making every reasonable effort to reduce the Contract Time.
- § 8.2.4 In no case shall the Contractor delay the progress of the Work, or any part thereof, on account of changes in the Work or disputes caused by proposed or ordered changes in the Work (including the equitable value of the changes), or any disputes or disagreements as to the Work or extra work.

- § 8.2.5 If the Contractor is not maintaining the pace of the Work in accordance with the approved construction schedule or otherwise consistent with the Contract Time, and such delays are not excusable as set forth in Section 8.3, then the Owner may require the Contractor to undertake a time recovery plan (including more personnel, overtime and/or additional shifts) at the Contractor's sole expense, to reasonably assure substantial and final completion of the Work within the Contract Time.
- § 8.2.6 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 without the express written authorization of the Owner. 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.
- § 8.2.7 The Contractor understands that in order to meet the requirements of the Project schedule, including intermittent milestone and critical path dates set forth in the Contract Documents, it may be required to work its personnel and equipment overtime on regular workdays and on Saturdays and holidays, the cost of which is included in the Contract Sum. If the Owner specifically approves in writing reimbursement for overtime, the Contractor shall be paid by the Owner on the basis of the premium payment.
- § 8.2.7.1 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 Construction Manager for providing the site to the Contractor during the additional time periods.
- § 8.2.8 The Owner shall have the right at any time to modify the Project Schedule; to suspend, delay or accelerate, in whole or in part, the commencement or execution of the Work or any potion thereof or to vary the sequence thereof; and to prescribe the time, order and priority of the various portions of the Work, and all other matters relating to the scheduling of the Work. The Contractor shall not be entitled to additional compensation for any such decisions made by the Owner.
- § 8.2.9 The Owner may request the Contractor to work overtime to expedite the completion of the Work or a portion of the Work, at a time when the Contractor is not behind schedule or otherwise in default of any of the provisions of the Contract. The Contractor agrees to work said overtime, and the Contractor shall be reimbursed only for the Contractor's extra labor cost over the amount of regular time during the period of such overtime, including additional fringe benefit costs, insurance and taxes incurred by it with respect thereto and only those other actual costs of the Contractor directly related to said overtime, which have been approved in advance by the Owner. Time slips covering said overtime must be submitted to the Owner on a daily basis for checking and approval. The Contractor shall not be compensated for any lost efficiency or production alleged to have resulted from said overtime work.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed in the commencement or progress of the Work as a result of: Acts of God (such as tornado, flood, hurricane, pandemics, epidemics, etc. making performance temporarily impossible); the negligent acts or omissions of the Owner, Architect, Construction Manager, other Contractors, or their agents or employees; strikes, lockouts or other labor disturbances (not arising from the labor practices of Contractor or its Subcontractors, Suppliers, or Sub-subcontractors to comply with their obligations arising under the Contract); unusually adverse weather conditions; freight embargoes (provided that delays by the Contractor, its Subcontractors, Sub-subcontractors or Suppliers do not constitute an excusable cause of delay); changes in the work to be performed by the Contractor (not caused or resulting from the failure of the Contractor or its Subcontractors, Suppliers or Sub-subcontractors); or changes to laws or regulations after the effective date of the Contract, provided the Contractor has used all reasonable efforts to mitigate the foregoing causes; then the Contractor shall be entitled to a day for day extension of the Contract Time for the established delay to the critical path of the Work subject to the provisions of this Article 8 and Article 15. All other delays of the Project, including but not limited to, Architect review and/or approval of shop drawings or other 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 among the Multiple Prime Contractors; unavailability of materials and/or equipment; surveying/testing; closeout, etc. are deemed

to be foreseeable and contemplated and, therefore, shall not form the basis for a claim for an extension of time or additional compensation by the Contractor. The extension of time provided under this Section 8.3.1 shall be the Contractor's exclusive remedy.

- § 8.3.1.1 The Contractor further acknowledges and agrees that adjustments in the Contract Time will be permitted for a delay only to the extent such delay (1) is not caused or could not have been anticipated by the Contractor, (2) could not be limited or avoided by the Contractor's timely notice to the Owner of the delay or reasonable likelihood that a delay will occur, and (3) is of a duration of more than one (1) day.
- § 8.3.1.2 The Contractor's inability to secure sufficient personnel for the performance of the Work shall not constitute a basis for an extension of time. The Contractor shall not be entitled to an extension of time if the Architect or Construction Manager stops the Work due to the existence of or reasonable suspicion of a deficiency in the Work.
- § 8.3.1.3 An extension of the Contract Time, if requested by the Contractor, shall only be considered after the Contractor has made reasonable effort to recover the lost time. An extension, or extensions, of time may be granted subject to the provisions of this Article 8, but only after written application therefore by the Contractor. An extension of time shall be only for the number of days of delay which the Architect may determine to be due solely to the causes set forth in the application for extension of time. The Contractor shall not be entitled to receive a separate extension of time for each one of several causes of delay operating concurrently; but if at all, only the actual period of delay as determined by the Construction Manager or Architect.
- § 8.3.1.4 All requests for additional time shall be made in writing, delivered to the Construction Manager within five (5) calendar days from the time when the circumstance with potential for delay becomes reasonably known to the Contractor, 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 through no fault of the Contractor or anyone for whom the Contractor is responsible, and that the Project schedule cannot be maintained by re-ordering other activities within the Project at no cost. This request shall also contain, at a minimum, the following information: (1) date of start of delay; (2) specific cause of delay; (3) effect of delay on construction progress; and (4) date of termination of delay. 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. When 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; rather, only the actual period of delay as determined by the Owner or its Architect may be allowed.
- § 8.3.1.5 Failure of the Contractor to give written notice as required by Section 8.3.1.4 or to strictly comply with the requirements of Article 8 shall be deemed conclusively to be a waiver and release of such claim, and such notice shall be a condition precedent to the Contractor's right to make a claim for any claim arising out of, under or in connection with the Contractor or the performance of the Work.
- § 8.3.2 Notwithstanding anything to the contrary in the Contract Documents, an extension in the Contract Time, to the extent permitted and justified under Section 8.3.1, shall be the sole remedy of the Contractor for, and the Contractor waives its right to any claim for damages to the extent arising from, 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 claims for disruption, interference, inefficiencies, impedance, hindrance, acceleration, resequencing, schedule impacts, lack of timeliness by the Owner or its consultants, and lack of coordination, errors or omissions in the design of the Project, cumulative impact of multiple change orders, unavailability of labor, materials or equipment, delays and other impacts (collective referred to herein as "Delay(s)"). 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, delay costs, loss of productivity or efficiency, lost profits, extended jobsite general conditions and home office overhead, 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 interference, hindrance or obstruction with the Contractor's performance of the Work and shall not entitle the Contractor to any additional compensation. The Contractor shall include a no-damages-for-delay clause in all subcontracts for the performance of the Work.

- § 8.3.3 Delays that affect the scheduled completion of the Work and are attributable to interference between Multiple Prime Contractors, Separate Contractors, Subcontractors, suppliers, utility companies or municipalities, shall be compensated solely by the granting of an extension of time to the Contractor by the Owner to complete the Work without charges to the Owner. The parties acknowledge that the Contract Time takes into account the time necessary for review of submittals and shop drawings, correcting design errors or omissions, coordination amongst Multiple Prime Contractors and Separate Contractors, change orders, delays incurred by seasonal limitations, work by utilities, and other administrative processing by all parties involved and are not compensatory. The Contractor agrees that it has included in its Bid prices the additional cost of doing work under this Contract caused by interference of the Architect, Construction Manager, other Multiple Prime Contractors, Separate Contractors, Subcontractors, utility companies, etc. and the other non-compensatory Delays described above.
- § 8.3.4 When the Contract Time has been extended, as provided under Section 8.3, such extension of time shall not be considered as justifying extra compensation to the Contractor for administrative costs, home office, estimating, extended general conditions or other similar impact costs. The Contractor acknowledges that in agreeing to the Contract Sum it assessed the potential impact of the limitations in Section 8.3.2 on its ability to recover additional compensation in connection with a Work delay, interference, impact or hindrance and agrees that those limitations shall apply regardless of the accuracy of the Contractor's assessment or actual costs incurred by the Contractor.
- § 8.3.5 If the Contractor submits a progress report indicating, or otherwise expresses an intention to achieve, completion of the Work prior to any completion date required by the Contract Documents or expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created or implied.
- § 8.3.6 The intent of the Contract is for Work to follow a logical sequence. The Contractor, however, may be required by the Owner, Construction Manager or Architect to temporarily omit or leave out any section of Work or perform Work out of sequence. Out of sequence work and come back time to these areas shall be performed at no additional cost to the Owner.
- § 8.3.7 Claims relating to Contract Time shall be made in accordance with applicable provisions of Article 15.
- § 8.3.8 The Contractor understands that the timely prosecution of its obligations under the Contract is essential to the efficient completion of the Project and may have a direct bearing on the costs incurred by all other Contractors and Separate Contractors. The Contractor's obligations in this regard include, but are not limited to: 1) completing the Work in an orderly fashion and in accordance with an agreed upon progress schedule; 2) timely coordination and cooperation with the Owner, the Architect and the other Contractors and Separate Contractors to resolve disruptions, interferences or other problems as they arise; 3) providing sufficient personnel, systems and procedures to ensure that required materials, supplies and skilled human resources are available so that the Work is timely understood, anticipated, progressed and communicated where required to others involved with the Project; 4) maintaining accurate job progress schedules and systems; 5) timely notifying others working on the site when delays or interferences occur that will affect the Contractor's or other's work pertaining to the Project; 6) providing a skilled, informed and properly supported superintendent at the Project sites and at all required job meetings to provide meaningful information and commitments to efficiently cooperate in coordinating the work of the various contractors; and 7) timely reviewing all job minutes, correspondence and other communications and responding to same when required.
- § 8.3.9 The Contractor agrees that its failure to timely cooperate and proceed can substantially increase the costs of other Contractors and Separate Contractors in attempting to timely prosecute their obligations under related contracts. Accordingly, the Contractor recognizes that other Contractors and Separate Contractors on the site are third-party beneficiaries of the Contractor's obligation to timely coordinate and prosecute its obligations under the Contract Documents. The Contractor hereby waives and shall not raise as a defense the absence of privity of contract between the Contractor and the other Contractors and Separate Contractors in any claim hereafter asserted by other Contractors or Separate Contractors to recover costs or damages for delay or interference and shall be responsible to other

Contractors and Separate Contractors on the site for damages caused by the Contractor's failure to timely and properly perform its contractual obligations under the Contract Documents.

§ 8.4 Liquidated Damages

§ 8.4.1 The Contractor realizes that time is of the essence on this Contract and the Construction Schedule shall be submitted per the requirements of the Contract Documents. In the event the Contractor fails to submit a Construction Schedule by said date, the sum per calendar day of THREE HUNDRED DOLLARS (\$300.00) will be subtracted from the Contract Sum due the Contractor in the form of a change order.

§ 8.4.2 The Contractor realizes that time is of the essence on this Contract and the completion date for any work or the date of Substantial Completion shall be no later than the date indicated in these Contract Documents. The Contractor understands that the substantial disruption of the Owner's educational process will occur if the project is not completed by the dates outlined in Division 1 of the Specifications. In the event that the Contractor fails to complete any work or substantially complete the work under the Contract by the date that is thirty (30) days after the scheduled date(s) of Substantial Completion, the sum per calendar day of ONE THOUSAND DOLLARS (\$1,000.00) will be deducted from the Contract Sum due the Contractor in the form of a change order or construction change directive, except in cases where a delay is due to unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including acts of God, or of the Public enemy, acts of the government, in either sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, freight embargos, or delays of Subcontractors or suppliers due to such causes. Delays in acquisition of materials other than by reason of freight embargoes will not constitute a delay excusable under this provision unless approved by the Owner in advance and in writing.

Within five (5) calendar days from the occurrence of any such delay, the Contractor shall notify the Owner in writing the cause of delay. The Owner will ascertain the facts and extent of the delay, and extend the time for completing the Work when in his judgment the findings of fact justify such an extension. The Owner's findings of fact will be final and binding on any litigation.

The said sum per calendar day shall constitute the Liquidated Damages incurred by the Owner for each day of delay beyond thirty (30) days after the agreed upon date(s) of Substantial Completion. Such Liquidated Damages shall be in addition to any other damages (other than by reason of delay) the Owner may incur as a result of the Contractor's breach of Contract. 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 regular school hours. Such work shall only be performed after regular school hours, Saturdays, Sundays, holidays or periods when school is unoccupied at no additional cost of any kind to the Owner. In addition to Liquidated Damages, the Contractor shall be liable for all additional costs incurred by the Owner after the Substantial Completion Date (as well as Milestone Dates) stated in the Contract Documents for its own employees to make the Owner's property and facilities accessible to the Contractor beyond regular school hours and incurred by the Owner for Construction Manager services and Architect services performed for the Project due to the Contractor's failure to complete its work by the Substantial Completion Date (and Milestone Date) stated in the Contract Documents, including but not limited to the additional costs incurred for extending the duration of their services and for performing inspections after regular school hours or on Saturdays, Sundays or holidays.

All costs incurred by the Owner, Owner's Representative, Architect, Architect's consultants, for the cost of additional inspections, at the rate of ONE THOUSAND DOLLARS (\$1,000.00) per inspection or more due to time requirements, 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. Additionally, a cost of \$750 per day for extended Construction Management time will be charged to the Contractor causing the delay.

§ 8.4.3 Notwithstanding the foregoing, if one or more of the liquidated damages provisions set out in the Agreement are held to be legally unenforceable as a penalty, the Owner shall be allowed to recover actual damages caused by the Contractor's failure to achieve the applicable Contract Time requirements.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents. Notwithstanding anything to the contrary contained in the Contract Documents, the Owner may withhold or offset any payment to the

Contractor if and for so long as the Contractor fails to perform any of its obligations under any of the Contract Documents; provided, however, that any such holdbacks shall be limited to an amount sufficient in the reasonable opinion of the Owner to cure any default or failure of performance by the Contractor.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

- § 9.2.1 Within 30 days of Contract Award, the Contractor shall submit to the Construction Manager a schedule of values allocated to various portions of the Work for each building, prepared in the currently authorized form of AIA Document G703 - Continuation Sheet and supported by such data to substantiate its accuracy as the Construction Manager and Architect may require. This schedule, unless objected to by the Construction Manager or Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. The schedule of values shall state the names of all Subcontractors, Sub-subcontractors and material suppliers and the amounts to become due to each breakdown by specification section. The schedule of values shall contain, along with individual work items, separate line items for (1) mobilization, bonds, insurance, etc., (2) value of administrative close out submittals, (3) Allowance(s) if required elsewhere in the Project Manual, (4) separate subtotals by building, and (5) buildings further separated between "Additions/New Construction" and "Renovations/Reconstruction" as applicable. At the direction of the Architect, it shall include quantities, if applicable. The total for all items shall aggregate the Contract Sum.
- § 9.2.2 Any schedule of values that 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 Contractor's future applications for payment to ensure an adequate reserve (exclusive of normal retainage) to complete the Contractor's Work.
- § 9.2.3 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.

§ 9.3 Applications for Payment

- § 9.3.1 In accordance with Article 5 of the Agreement and the Payment Procedures in the Specifications, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, notarized and reflecting retainage as provided elsewhere in the Contract Documents. Applications for Payment will be in the currently authorized form of AIA Document G732 - 2019, "Application and Certificate for Payment," accompanied by AIA Document G703-1992, "Continuation Sheet," and must include (add and/or deduct) adjustments to the Contract Sum resulting from Work performed under approved Change Orders (specified under Article 7) and shall be shown separately on the application for previous and current periods. Each Application and Certificate of Payment shall be accompanied by two (2) copies of the Pay Application Lien Waiver and Release in the form set forth in the Payment Procedures in the Specifications, certified payroll for employees of the Contractor and employees of Subcontractors performing work on the Project, and such other information required by the Owner. Each Application for Payment shall be prepared in such form and supported by such data to substantiate the Contractor's right to payments as the Owner, Construction Manager or Architect may require such as copies of requisitions from Subcontractor and material suppliers. Each Application for Payment forwarded to the Owner by the Construction Manager or Architect shall be subject to audit and approval by the Owner in accordance with the Owner's normal audit.
- § 9.3.1.1 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 circumstances set forth in Section 9.5.1. If any such adjustments are made by the Architect or Construction Manager, the Contractor shall submit an original itemized revised application with all documentation required by Section 9.3.1.
- § 9.3.1.2 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Construction Manager and Architect, but not yet included in Change Orders.

- § 9.3.1.3 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier unless such Work has been performed by others whom the Contractor intends to pay.
- § 9.3.1.4 Until Substantial Completion, the Owner shall pay ninety-five percent (95%) of the amount due the Contractor on account of progress payments, less an amount necessary to satisfy any claims, liens, or judgments against Contractor, which have not been suitably discharged. In accordance with Section 9.8.5, the Owner shall pay the entire amount retained from previous progress payments less two (2) times the amount required to complete items identified in a list prepared in accordance with Section 9.8.2 and the amount required to satisfy any outstanding claims, liens, or judgments against the Contractor.
- § 9.3.1.5 The Contractor and its Subcontractors are required to submit certified payroll information to the Owner in accordance with New York State Law.
- § 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the Project site for subsequent incorporation in the Work. If approved in advance in writing by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest. The costs of applicable insurance, storage, and transportation to the site for such materials and equipment stored off the site shall not increase the Contract Sum.
- § 9.3.2.1 Payment may be made for materials and equipment delivered and suitably stored on-site for future incorporation in the Work, subject to the following conditions:
 - Request for payment shall be considered for material or equipment, which is in short or critical supply, which has been specially fabricated for the Project or, at the discretion of the Construction Manager and Architect, for other materials or equipment.
 - A request for payment of material stored on-site must be made by the Contractor ten (10) days prior to .2 actual, monthly cut-off date for Payment Applications.
 - .3 Procedures required by the Owner shall include, but not necessarily limited to, submission by the Contractor to the Construction Manager and Architect of bills of sale and bills of lading for such materials and equipment, provisions of opportunity for the Construction Manager's and Architect's visual verification that such materials and equipment are in fact in storage; and, if stored off-site, submission by the Contractor of verification that such materials and equipment are stored in a bonded
 - All such materials and equipment, including materials and equipment stored on-site but not yet incorporated into the Work, upon which partial payments have been made shall become the property of the Owner, but the care and protection of such materials and equipment shall remain the responsibility of the Contractor until incorporation into the Work and accepted by the Owner at substantial completion, including maintaining insurance coverage on a replacement cost basis without voluntary deductible.
- § 9.3.2.2 Payment may be made for materials and equipment delivered and suitably stored off-site for future incorporation in the Work, subject to the following conditions:
 - The Contractor shall submit: a written validation by the Owner, Construction Manager or Architect that such materials are stored safely off site, in the quantities and condition stated by the Contractor; a copy of an invoice for the material and equipment; a bill of sale or equivalent indication of the quantity and value of the material or equipment; a written statement indicating the location and method of storage; and property insurance certificate or rider covering the specific material or equipment, which shall name the Owner as an additional insured party.
 - The Contractor shall submit a verification that such materials and equipment are stored in a bonded .2 warehouse.
 - .3 A request for payment of material stored off-site must be made by the Contractor 10 days prior to actual, monthly cut-off date for Payment Applications.

- All such materials and equipment upon which partial payments have been made shall become the property of the Owner, but the care and protection of such materials and equipment shall remain the responsibility of the contractor until incorporation into the Work and accepted by the Owner at substantial completion, including maintaining insurance coverage on a replacement cost basis without voluntary deductible.
- § 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.
- § 9.3.4 The Contractor further expressly undertakes to defend the Indemnitees (as defined previously in Section 3.18), at the Contractor's sole expense, against any actions, lawsuits or proceedings brought against Indemnitees as a result of liens filed against the Owner, the Work, the site of any of the Work, the Project site and any improvements thereon, payments due the Contractor or any portion of the property of any of the Indemnities (referred to collectively as liens in this Section 9.3.4). The Contractor hereby agrees to defend, indemnify, and hold Indemnitees harmless against any such liens or claims of lien and agrees to pay any judgment or lien resulting from any such actions, lawsuits, or proceedings.
- § 9.3.5 The Owner shall release any payments withheld due to a lien or a claim of 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 than One Hundred Fifty percent (150%) of such lien claim. By posting a lien bond or other acceptable security, however, the Contractor shall not be relieved of any responsibilities or obligations under this Section 9.3, including, without limitation, the duty to defend and indemnify the Indemnities in an action on the lien, lien discharge bond or underlying debt. The cost of any premiums incurred in connection with such bonds and security shall be the responsibility of the Contractor and shall not be part of, or cause any adjustment to, the Contract Sum.
- § 9.3.6 Notwithstanding the foregoing, the Owner reserves the right to settle any disputed public improvement lien claim by payments to the lien claimant or by such other means as the Owner, in the Owner's sole discretion, determines is the most economical or advantageous method of settling the dispute. The Contractor shall promptly reimburse the Owner, upon demand, for any payments so made.

§ 9.4 Certificates for Payment

- § 9.4.1 The Construction Manager will, within seven (7) days after the Construction Manager's receipt of the Contractor's Application for Payment, review the Application, certify the amount the Construction Manager determines is due the Contractor, and forward the Contractor's Application and Certificate for Payment to the Architect. Within seven (7) days after the Architect receives the Contractor's Application for Payment from the Construction Manager, the Architect will either issue to the Owner a Certificate for Payment, with a copy to the Construction Manager, for such amount as the Architect determines is properly due, or notify the Construction Manager and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1. The Construction Manager will promptly forward to the Contractor the Architect's notice of withholding certification.
- § 9.4.2 Where there is more than one Contractor performing portions of the Project, the Construction Manager will, within seven (7) days after the Construction Manager receives all of the Contractors' Applications for Payment: (1) review the Applications and certify the amount the Construction Manager determines is due each of the Contractors; (2) prepare a Summary of Contractors' Applications for Payment by combining information from each Contractor's application with information from similar applications for progress payments from the other Contractors; (3) prepare a Project Application and Certificate for Payment; (4) certify the amount the Construction Manager determines is due all Contractors; and (5) forward the Summary of Contractors' Applications for Payment and Project Application and Certificate for Payment to the Architect.
- § 9.4.2.1 Within seven (7) days after the Architect receives the Project Application and Project Certificate for Payment and the Summary of Contractors' Applications for Payment from the Construction Manager, the Architect will either

- (1) issue to the Owner a Project Certificate for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Project Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Project Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward the Architect's notice of withholding certification to the Contractors.
- § 9.4.3 The Construction Manager's certification of an Application for Payment shall be based upon the Construction Manager's evaluation of the Work and the information provided as part of the Application for Payment. The Construction Manager's certification will constitute a representation that, to the best of the Construction Manager's knowledge, information and belief, the Work has progressed to the point indicated and the quality of the Work is in accordance with the Contract Documents. The certification will also constitute a recommendation to the Architect and Owner that the Contractor be paid the amount certified.
- § 9.4.4 The Architect's issuance of a Certificate for Payment shall be based upon the Architect's evaluation of the Work, the recommendation of the Construction Manager, and information provided as part of the Application for Payment. The Architect's certification will constitute a representation that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated, that the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified.
- § 9.4.5 The representations made pursuant to Sections 9.4.3 and 9.4.4 are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Construction Manager or Architect.
- § 9.4.6 The issuance of a separate Certificate for Payment or a Project Certificate for Payment will not be a representation that the Construction Manager or Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed the Contractor's construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

- § 9.5.1 The Construction Manager or Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Construction Manager's or Architect's opinion the representations to the Owner required by Section 9.4.4 and 9.4.5 cannot be made. If the Construction Manager or Architect is unable to certify payment in the amount of the Application, the Construction Manager will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor, Construction Manager and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Construction Manager or Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Construction Manager's or Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from the acts and omissions described in Section 3.3.2 because of
 - defective Work not remedied; .1
 - .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
 - .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment:
 - .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
 - .5 damage to the Owner, another Prime Contractor or a Separate Contractor;
 - .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
 - .7 failure to carry out the Work in accordance with the Contract Documents;
 - .8 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;

- failure to comply with applicable federal, state or local statutes, regulations, and/or laws, including, without limitation, laws and regulations applicable to the provision of certified payrolls;
- .10 failure of the Contractor to provide executed performance and payment bonds and a current certificate of insurance and endorsements;
- .11 reasonable evidence that the Work has not progressed as indicated on the Application for Payment;
- .12 damages caused to the Owner, Construction Manager, the Architect or another Contractor as a result the Contractor's performance of its Work;
- .13 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;
- .14 The amount requested exceeds the percent completion of Work on the site; or
- .15 breach of this Agreement.

Notwithstanding the extent to which the Construction Manager and/or Architect certify an Application for Payment, the Owner shall have the right to withhold payment, in whole or in part, should the Owner determine that any of the grounds for withholding certification set forth in this Section 9.5.1 do in fact exist. If the Owner withholds payment, in whole or in part, the Owner shall promptly provide to the Contractor, Architect and Construction Manager a written explanation of the reason(s) for which payment is withheld and shall promptly pay, in accordance with the Contract Documents, all amounts which are not in dispute.

- § 9.5.2 If the Contractor disputes any determination by the Owner, Construction Manager or Architect with regard to any Certificate for Payment or in the event of a bona fide dispute between the Contractor and Owner, the Contractor nevertheless shall expeditiously continue to prosecute the Work and may submit a Claim in accordance with Article
- § 9.5.3 When the above reasons for withholding certification or the Owner's withholding of payment are removed, certification will be made for amounts previously withheld.
- § 9.5.4 If the Architect or Construction Manager withholds certification for payment under Section 9.5.1, or if the Owner otherwise deems it necessary to protect its interests or the interests of the Project, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Construction Manager and both will reflect such payment on the next Certificate for Payment.
- § 9.5.5 Notwithstanding anything above to the contrary, the Owner has the right to withhold payment to the Contractor to protect itself against damages incurred or which may be incurred as a result of the Contractor's breach or negligence, including, but not limited to, the items set forth in Section 9.5.1. With respect to any liens, claims, or other circumstances for which the Owner is entitled to withhold payments pursuant to decisions by the Architect pursuant to Section 9.5.1, the Owner shall be entitled to withhold a sum equal to twice the stated amounts of such liens or claims, or, where there is no stated amount, twice the amount determined by the Architect to be necessary to protect the interests of the Owner. The Owner will release payments withheld due to liens provided that the Contractor obtains a discharge of record of such lien, by bonding or otherwise. By posting a lien discharge bond, however, the Contractor shall not be relieved of any responsibilities or obligations under the Agreement, including, without limitation, the duty to defend, indemnify, and hold harmless the Indemnitees (as defined previously in Section 3.18). The cost of any premiums or other expenses incurred in connection with such bonds or other means of discharge of record shall be the sole responsibility of the Contractor and shall not be part of, or cause any adjustment to, the Contract Sum.
- § 9.5.6 If the Owner is entitled to reimbursement or payment from the Contractor under or pursuant to the Contract, including but not limited to these General Conditions, 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 Contract Sum by an amount equal to that which the Owner is entitled.

§ 9.6 Progress Payments

- § 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents unless such requisition is not in accordance with the terms of the Contract Documents, and shall so notify the Construction Manager and Architect.
- § 9.6.2 Payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held in trust by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contracts with the Contractor for which payment was made by the Owner. The Contractor shall strictly comply with any common law, statutory, or decisional law trust fund requirements in the State of New York (including, without limitation, the requirements of New York Lien Law Article 3-A), and hereby agrees that the Owner has the same rights as any beneficiary of such trusts to examine the books and records of the Contractor to determine such compliance, from time to time at the Owner's sole discretion. The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in similar manner.
- § 9.6.2.1 Within seven (7) days of receipt of a payment from the Owner, the Contractor shall pay each of its Subcontractors and suppliers for work performed and materials furnished by them as reflected in the payment from the Owner, less an amount necessary to satisfy any outstanding claims, liens, or judgments and less a retained amount of not more than 5%, except that the Contractor may retain not more than 10% provided that prior to entering into a Subcontract with the Contractor, the Subcontractor is unable or unwilling to provide a performance bond and labor and material payment bond both in the full amount of the subcontract at the request of the Contractor. The Contractor shall not retain portions of the proceeds owed any Subcontractor or supplier from the Owner's payment to the Contractor for the "contract balance." Similar provisions apply to the Subcontractor and/or supplier paying each of its Subcontractors and suppliers. Nothing in this Section shall create in the Owner any obligation to pay, or to ensure that the Contractor pays, any Subcontractor or supplier, or any relationship in contract or otherwise, implied or expressed, between any Subcontractor or supplier and the Owner. The Contractor agrees that it shall comply with the payment requirements of Section 106-b(2) of the New York General Municipal Law, as amended, and that to the extent there is any conflict between that statutory section and the provisions of this Section 9.6.2.1, the provisions of the statute shall prevail.
- § 9.6.3 The Construction Manager will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Owner, Construction Manager and Architect on account of portions of the Work done by such Subcontractor.
- § 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven (7) days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Construction Manager nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor except as may otherwise be required by law.
- § 9.6.5 The Contractor's payments to its suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.
- § 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.
- § 9.6.7 Payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

(Paragraph deleted)

§ 9.7 Failure of Payment

§ 9.7.1 If, through no fault of the Contractor, the Construction Manager and Architect do not issue a Certificate for Payment within 20 days of the Construction Manager's receipt of the Contractor's Application for Payment or if, through no fault of the Contractor, the Owner does not pay the Contractor the amount certified by the Construction Manager and Architect, subject to the Owner's right to withhold payment under the terms of the Contract Documents, within 30 days of the date established for such payment in the Contract Documents, then the Contractor may, upon seven (7) additional days' written notice and opportunity to cure to the Owner, Construction Manager and Architect, stop the Work until payment of the amount owing has been received. To the extent it is determined that payment to the Contractor was improperly held through no fault of the Contractor and the Contractor elected to stop its Work consistent with the procedure set forth in this Section, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up as provided for in the Contract Documents. However, if the Contractor stops its Work and it is determined that the Owner had the right to withhold payment under the terms of the Contract Documents, then the Contractor shall be responsible to the Owner for all costs and damages (including attorneys' fees) arising from such stoppage of Work and the Contractor shall not be entitled to any adjustment in the Contract Sum or the Contract Time. This Section shall not apply: (a) to the extent that the Contractor owes to the Owner any amount pursuant to the provisions of this Contract, or (b) to the extent the Owner is required to expend amounts to purchase additional insurance on behalf of the Contractor to meet the insurance requirements of this Agreement.

§ 9.7.2 If the Owner is entitled to payment from the Contractor under or pursuant to the Contract Documents, such payment shall be made promptly upon demand by the Owner. Notwithstanding anything contained in the Contract Documents to the contrary, if the Contractor fails to promptly make any payment due the Owner, or the Owner incurs any costs or 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 Contract Sum by an amount equal to that which the Owner is entitled.

§ 9.8 Substantial Completion

§ 9.8.1 The date of Substantial Completion of the Project or a designated portion thereof is the date when construction is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the entire Project (or such portion thereof as Owner earlier elects to occupy or utilize) for the use for which it is intended. Minor items of completion or correction ("Punch List Work") may be performed after Substantial Completion, provided that such items can and shall be performed at such times and in such manner that such Work does not unreasonably interfere with the Owner's occupancy and use of the Project. Substantial Completion shall not be deemed to exist until (a) the Owner receives a Certificate of Occupancy for the Project (or such portion as elected by Owner) if such Certificate of Occupancy is required, and any other permits, approvals, licenses and any other documents from governmental authorities having jurisdiction therefore necessary for the beneficial occupancy of the Project and (b) the Contractor, Construction Manager, Architect and Owner have agreed upon a schedule for final completion and to provide the Owner with all as-built drawings, operating manuals, warranties and other required closeout documents. Warranties called for by the Agreement or by the Drawings and Specifications shall commence on the date of Substantial Completion of the Project or designated portion thereof, or any later date that the parties agree. This date shall be established by a Certificate of Substantial Completion signed by the Owner, Contractor, Architect and Construction Manager.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify the Construction Manager, and the Contractor and Construction Manager shall jointly prepare and submit to the Architect a comprehensive list which shall identify all non-conforming, defective and incomplete Work and establish the date of commencement of warranties in connection with any such Work. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the list, the Architect, assisted by the Construction Manager, will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the list, which is not sufficiently complete in accordance with the requirements of the Contract Documents so that the Owner can occupy or utilize the Work or designated portion

thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Construction Manager or Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect, assisted by the Construction Manager, to determine Substantial Completion. If the Architect and the Construction Manager are required to perform additional substantial completion inspections because the Work fails to be substantially complete, the amount of compensation paid to the Architect and the Construction Manager by the Owner for additional services shall be deducted from the final payment to the Contractor.

- § 9.8.4 When the Architect, assisted by the Construction Manager, determines that the Work or designated portion thereof is substantially complete, the Construction Manager will prepare, and the Construction Manager and Architect shall execute a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all Punch List Work, which timeframe shall not exceed 30 days. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.
- § 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.
- § 9.8.5.1 In conformance with New York General Municipal Law Section 106-b(1)(a), upon proper execution of Certificate of Substantial Completion of Work, the Contractor shall submit a requisition for payment of the remaining amount of the Contract Sum. Upon certification of payment by the Architect, the Owner will approve and promptly pay the remaining amount of the Contract Sum less two times value of any remaining items to be completed or corrected and less an amount necessary to satisfy any claims, liens or judgments against Contractor which have not been suitably discharged. Such payment shall be made under terms and conditions governing final payment except that the Owner's making of such payment shall not constitute the Owner's waiver of any objection to all or any portion of the Work performed by the Contractor or any claims the Owner may then have against the Contractor.
- § 9.8.5.2 Neither the requisition for payment stipulated in Section 9.8.5.1 nor any portion of retained percentage shall become due until the Contractor submits to the Construction Manager:
 - an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the work for which the Owner or the Owner's property might in any way be responsible, have been paid or otherwise satisfied, the form of which will be the currently authorized AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims";
 - .2 consent of all sureties, if any, to such payment, the form of which will be the currently authorized AIA Document G707A, "Consent of Surety to Reduction in or Partial Release of Retainage," but which will not be required if the amount withheld under Section 9.8.3.1 exceeds the amount of retainage;
 - if required by the Owner, other data establishing payment or satisfaction of all such obligations, such as receipts, releases, and waivers of liens arising out of contract to such extent and in such form as may be designated by the Owner; and
 - all required closeout documents.
- § 9.8.5.3 As the Punch List Work is satisfactorily completed or corrected, the Contractor may submit a requisition for payment of these items. The Contractor shall submit with each such requisition for payment affidavits, consents of surety, and other data as described in Section 9.8.5.2 covering work for which payment is requested. Upon certification of such requisitions by the Architect and Construction Manager, the Owner will approve and promptly pay the requisition less an amount two times that which is necessary to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged.
- § 9.8.5.4 Where the Project includes heating, air conditioning, electrical, communication, data or other systems which are not put into operation at the time of occupancy, a sum shall be withheld until these systems have operated to the general satisfaction of the Architect. The Contractor shall provide complete start up and commissioning of the systems with a detailed check list as recommended by the equipment or system manufacturer. The retained amount shall approximate five percent (5%) of the cost of the systems as determined by the cost breakdown submitted. The

guaranty/warranty period for such systems will not commence until after such Architect approval.

- § 9.8.5.5 The Contractor shall complete the Punch List Work for the Project no later than 30 days after Substantial Completion of the Project. The Contractor shall be fully liable to the Owner for all damages suffered by the Owner as a result of delay in achieving final completion of the Work, including without limitation, additional architectural and construction management fees related to extended services.
- § 9.8.6 If the Architect or the Construction Manager is required to inspect the Work more than two (2) times prior to certifying the Work as being substantially complete on account of the discovery of one or more items that are not sufficiently complete, the Contractor shall be liable to the Owner for the amount of any costs, additional fees or compensation due from or paid by the Owner to the Architect and/or the Construction Manager for the additional inspections.

§ 9.9 Partial Occupancy or Use

- § 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor and Construction Manager shall jointly prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect after consultation with the Construction Manager.
- § 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Construction Manager, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.
- § 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.
- § 9.9.4 The Contractor shall cooperate with the Owner in order to make portions of the Project available as soon as possible.
- § 9.9.4.1 The Project site and buildings, whether work of the Contractor is partially or fully completed or not, are property of the Owner who shall have certain rights and privileges in connection with use of same.
- § 9.9.4.2 Should there be, in the opinion of the Architect or Construction Manager, unwarranted delay on part of any Contractor in completion of incomplete or defective work or other Contract requirements, and the Architect so certifies, the Owner may have full or partial use and occupancy of any or all portions of buildings as required for moving in or installing furniture, fixtures, supplies, or equipment and for general cleaning and maintenance work. In such event, the Contractor whose unfinished work is done subsequent to installation of furniture, fixtures, equipment, etc., shall be responsible for the prevention of any damage to such installation. Such use or occupancy by the Owner shall in no instance constitute acceptance of any of the Work.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon completion of the Work, the Contractor shall forward to the Construction Manager a written notice that the Work is ready for final inspection and acceptance and shall also forward to the Construction Manager a final Contractor's Application for Payment. Upon receipt, the Construction Manager will evaluate the completion of Work of the Contractor and then forward the notice and Application, with the Construction Manager's recommendations, to the Architect who will promptly make such inspection. When the Architect, finds the Work acceptable under the Contract Documents and the Contract fully performed, the Construction Manager and Architect will promptly issue a final Certificate for Payment or Project Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due

and payable. The Construction Manager's and Architect's final Certificate for Payment or Project Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

- § 9.10.1.1 If the Work is not accepted by the Owner after final inspection and additional time is required to complete items identified during the final inspection, the date starting the two-year correction period described in Article 12.2 shall be set by the Architect at his discretion, but not later than the date of the final Certificate for Payment.
- **§9.10.1.2** If the Architect and the Construction Manager are required to provide additional services, extend the duration of services to the Owner, and/or perform additional final inspections because the Work fails to comply with the requirements of the Contract Documents, or the Contractor did not complete the Work in accordance with the construction schedule or Project schedule, the amount of compensation paid to the Architect and the Construction Manager by the Owner for additional services shall be deducted from the final payment due to the Contractor.
- § 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect through the Construction Manager (1) all closeout documents required by the Contract Documents, including, without limitation, as-built drawings, attic stock, maintenance manual, operating instructions and other documents required to be delivered under the Contract in connection with the Work in the form required by the Owner, (2) confirmation that all start-up, testing, balancing and commissioning of systems, equipment and other materials has been successfully completed as required by the Contract Documents, (3) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (4) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (5) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (6) consent of surety, if any, to final payment, (7), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner, and (8) all warranties and guarantees required by the Contract Documents. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.
- § 9.10.2.1 In addition to the submittals required in Section 9.10.2 above, the Contractor shall submit separate final release or waivers of lien for each Subcontractor, material supplier, or others with lien rights against the Project, and shall submit a list of such parties.
- § 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Construction Manager and Architect so confirm, the Owner shall, upon application by the Contractor and certification by the Construction Manager and Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect through the Construction Manager prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment

(Paragraphs deleted)

by the Owner shall not constitute a waiver of claims, causes of action, damages or complaints by the Owner.

- § 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing in accordance with Article 15 and identified by that payee in writing as unsettled at the time of the final Application for Payment.
- § 9.10.6 At any time a lien is filed against the Project funds, the Owner may demand that the Contractor discharge said

lien, through bonding or otherwise, and the Contractor must obtain the discharge of said lien within seven (7) days of such demand at the Contractor's sole cost and expense, and at no cost to the Owner. If any lien or other encumbrance required to be removed at the Contractor's sole cost and expense pursuant to this Section is not discharged of record as aforesaid, the Owner shall have the right to take such action as the Owner shall deem appropriate (which shall include the right to cause such lien or other encumbrance to be canceled and discharged of record), and in such event, all costs and expenses incurred by the Owner in connection therewith (including, without limitation, premiums for any bond furnished in connection therewith, and reasonable attorneys' fees,

court costs and disbursements), shall be paid by the Contractor to the Owner on demand or, at the option of the Owner, deducted from any payment then due or thereafter becoming due from the Owner to the Contractor in accordance with the provisions of these General Conditions.

- § 9.10.7 Existing warranties shall not deprive the Owner of any cause of action, right, or remedy otherwise available for breach of any of the provisions of the Contract Documents. The periods referred to above shall not be construed as limitations on the time in which the Owner may pursue any such action, right or remedy.
- § 9.10.8 The Contractor shall achieve final completion of all Work, including, without limitation, correction of punch-list items, preparation and delivery of all manuals, presentation of training and completion of final paper submissions not later than 30 days following the date of Substantial Completion. In the event the Contractor shall fail to achieve final completion of the Work within such a period of time, the Contractor and the Contractor's surety, if any, shall be liable for and shall reimburse the Owner for any and all fees paid to the Architect and Construction Manager and other expenses made necessary by the Contractor's failure. Additional fees and expenses shall be charged by the Owner against any Final Payment due or which may become due to the Contractor, and the Contractor shall promptly pay or refund the Owner the excess, if any, upon the Owner's written request.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY § 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, implementing, directing, controlling, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall submit the Contractor's safety program to the Construction Manager for review and coordination with the safety programs of other Contractors. The Construction Manager's responsibilities for review and coordination of safety programs shall not extend to direct control over or charge of the acts or omissions of the Contractors, Subcontractors, agents or employees of the Contractors or Subcontractors, or any other persons performing portions of the Work and not directly employed by the Construction Manager. The Contractor's safety precautions and programs shall include specific steps designed to minimize the risk of contracting or spread of COVID-19, including provision of all appropriate personal protective equipment, social distancing, avoiding stacking of trades, and other reasonable precautions.

- § 10.1.1 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 temporary fence and gates, traffic plans for deliveries and removals, refuse container locations, crane locations, pick locations, boom radium, and lift locations, stockpiles, toilet locations, site water and power locations, and safety. 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. The Contractor is required to submit its 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.
- § 10.1.2 The Contractor shall provide its own COVID-19 Safety Plan to the Owner prior to the start of any work. The Contractor shall designate a person on its staff to be responsible for monitoring the wearing of PPE by each person on site working with or for the Contractor. The Contractor shall strictly follow and ensure that its subcontractors follow the Contractor's COVID-19 Safety Plan as well as all applicable Center for Disease Control guidelines and federal, state and local orders and directives.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take necessary precautions for safety of, and shall provide reasonable protection to prevent damage, injury, infection or exposure to COVID-19, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor;
- .3 the Owner's real and personal property and other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction;
- .4 construction or operations by the Owner, Separate Contractors, or other Contractors; and
- .5 the existing buildings and premises in the vicinity of or affected by the Contractor's operations.
- § 10.2.1.6 Safe access to and egress from any building under construction as part of this Contract, or any existing building in which Work is being done under this Contract, shall be maintained and remain unencumbered by the Contractor in accordance with all applicable codes, rules and regulations of authorities having jurisdiction on the Work. The Contractor and its Subcontractors shall cooperate in maintaining this condition. Roadways, paths, walks, exits, service drives and other areas shall remain unobstructed and shall be maintained in a safe and satisfactory condition, for all persons using the building and premises. Materials shall not be stored promiscuously about the site or in the building, but shall be carefully stored in areas which will not interfere with pedestrian traffic or with access to and egress from adjacent properties and use of the building. The Contractor shall provide and maintain such temporary Work as may be required for the protection of its finished Work where liable to injury. The Contractor will be responsible for all of its Work, materials and equipment that may be damaged or stolen during the duration of the Contract and until the Work is accepted by the Owner. The Contractor shall make good any such damage or loss without expense to the Owner. The Contractor shall not permit unnecessary hazards to be created nor permit them to continue if they are discovered. The Contractor's storage and staging areas shall be only in locations assigned or approved by the Owner and Architect and may be required to be relocated by the Contractor as building occupancy or use changes during the course of the Work. This relocation will be done by the Contractor at no additional cost to the Owner.
- § 10.2.2 The Contractor shall comply with, and give notices required by, applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.
- § 10.2.2.1 The Contractor acknowledges that the Labor Law of the State of New York, and regulations adopted thereunder, place upon both the Owner and the Contractor certain duties and that liability for failure to comply therewith is imposed on both the Owner and the Contractor regardless of their respective fault. The Contractor hereby agrees that, as between the Owner and the Contractor, the Contractor is solely responsible for compliance with all such laws and regulations imposed for the protection of persons performing the Contract. The Contractor shall indemnify and hold harmless the Owner of and from any and all liability for violation of such laws and regulations and shall defend any claims or actions which may be brought against the Owner as the result thereof. In the event that the Contractor shall fail or refuse to defend any such action, the Contractor shall be liable to the Owner for all costs of the Owner in defending such claim or action and all costs of the Owner, including attorney's fee, in recovering such defense costs from the Contractor.
- § 10.2.2.2 All laborers, workers, and mechanics employed in the performance of the Work of this Project shall be certified as having successfully completed a course in construction safety and health approved by the United States Department of Labor's Occupational Safety and Health Administration that is at least 10 hours in duration. The Contractor and its Subcontractors shall conduct their operation in accordance with the Safety Guides for Construction as issued by State Education Department, and the Contractor's safety program.
- § 10.2.2.3 All safety equipment including hard hats, weather protective gear and PPE required for the Contractor to perform its Work are to be supplied by the Contractor or its Subcontractors. Within the designated construction areas, the Contractor's employees, superintendents, or other agents, and its Subcontractors, employees, superintendents, or other agents are required to wear hard hats and other required or essential safety equipment. Each person seen without a hard hat, or otherwise failing to comply with this requirement, will be ordered to leave the Project. No prior warnings will be given by the Owner, Construction Manager or Architect. The Contractor and its Subcontractors shall be solely responsible for making up and paying for any loss of production or required progress resulting from the removal of

personnel from the Project as set forth herein including any costs incurred by the Owner in connection with the work of other contractors.

- § 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.
- § 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.
- § 10.2.5 The Contractor shall promptly remedy damage and loss to property referred to in Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4, except damage or loss attributable to acts or omissions of the Owner, Construction Manager or Architect or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18, and shall not be limited by such damage or loss being insured under property insurance required by the Contract Documents.
- § 10.2.6 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. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner, Construction Manager and Architect.
- § 10.2.7 The Contractor shall not load or permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition. The Contractor shall not load any part of the Work with materials, equipment, shores, bracing, or other items which in any way could cause damage to the Work or to other Work or could endanger persons in or about the Work.
- § 10.2.8 If, during the construction, public or private property is damaged or destroyed as a consequence of its Work, the Contractor shall, at its own expense, restore such property to a condition equal to that existing before such damage or injury was done, by repairing, rebuilding or replacing it, or otherwise making good such damage or destruction in an acceptable manner.
- § 10.2.9 The Contractor shall be responsible for all breakage of glass, which has been furnished and installed as part of Contract and existing glass that is broken due to operations under the Contract for Work. No matter by whom or what cause glass was broken, the Contractor shall replace all broken glass before completion and acceptance of the Contractor's Work. The Contractor may claim damages, if applicable.
- § 10.2.10 In addition to all requirements set forth herein, the Contractor and its Subcontractors shall fully comply with the provisions of the federal Occupational Safety and Health Act of 1970, as amended, and with any rules and regulations pursuant to the Act. This requirement shall apply continuously and not be limited to normal working hours.
- § 10.2.11 The Contractor shall also be responsible, at the Contractor's sole cost and expense, for all measures necessary to protect any property adjacent to the Project and improvements therein. Any damage to such property or improvements shall be promptly repaired by the Contractor at its sole expense.
- § 10.2.12 The Contractor shall immediately contact the Construction Manager and, within 24 hours, report, in writing, to the Owner, Architect and Construction Manager, all accidents arising out of or in connection with the Work which cause death, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner, Construction Manager, and Architect.
- § 10.2.13 The Contractor shall be solely responsible for any conditions that develop during construction and in the event any structure is dislocated, over strained, or damaged so as to affect is usefulness, the Contractor shall be solely

responsible. The Contractor shall take whatever steps necessary to strengthen, relocate or rebuild the structure to meet requirements at the sole expense of the Contractor.

- § 10.2.14 The Contractor is responsible for restoration or repair of utilities, private property, buildings, pavement, walkways, roads, etc. damaged by its activities under this Agreement to the satisfaction of the Owner, Construction Manager and Architect.
- § 10.2.15 From the commencement to the final completion of the Work, the Contractor shall keep the Work and the Owner's building(s) free from accumulation of water no matter the source or cause of water infiltration.
- § 10.2.16 During construction, the Contractor shall be responsible for maintaining a watertight structure. This responsibility shall include additions/alterations of 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(s), the Contractor shall be responsible for all costs associated with clean up, remediation and repairs. Inasmuch as flooding and water damage have safety implications to the general public, clean up, remediation and repairs may be made by the Owner without prior notice to the Contractor. Administration costs incurred by the Owner, Construction Manager and Architect will also be back charged to the Contractor. The Contractor, by entering into this Contract, agrees to be liable for these costs.

§ 10.2.17 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials

- § 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents and all applicable laws, rules and regulations regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to, asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner, Construction Manager and Architect in writing. The Owner shall arrange for the material to be tested and if the test reveals that the material is a hazardous material or substance which has not been rendered harmless, the Owner shall pay for the test; otherwise, the Contractor shall bear the cost of the test and the Contract Sum shall be reduced by the amount of that cost. The Contractor shall comply with the reasonable instructions of the Owner after the test is conducted. This Section shall not apply in the case of asbestos which is to be removed and disposed of as part of the Work of the Contract.
- § 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify a presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.
- § 10.3.3 To the fullest extent permitted by law, but only to the extent of available insurance proceeds, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Construction Manager, Architect, their consultants, and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that the person seeking indemnification: (1) did not bring such material onto the Project site; (2) timely provided notice of the condition and stopped Work in the affected area as required by Section 10.3.1; and (3) has a claim, damage, loss or expense that is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself). The Owner shall have no indemnity obligation to the

extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity or the fault or negligence of a third party for whom the Owner is not responsible.

- § 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.
- § 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.
- § 10.3.6 If, without negligence or fault on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance (that was not brought to the site by the Contractor or those for whom the Contractor is responsible) solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.
- § 10.3.7 The Contractor shall notify the Owner of any storage, use, or discovery of hazardous material on the Project site which the Contractor knows or reasonably should know could cause bodily injury or death and of any injury or death attributable to any such hazardous material.
- § 10.3.8 The Contractor shall take all reasonable precautions and measures to prevent any contamination by or spread or disturbance of hazardous or potentially hazardous substances or materials stored, used, or discovered on the Project site.
- § 10.3.9 For the avoidance of any doubt, COVID-19 shall not be considered a Hazardous Material for purposes of this Article 10.3.

§ 10.4 Emergencies

- § 10.4.1 The Contractor shall provide at the site, such equipment and medical facilities as are necessary to supply first-aid service to anyone at the Work.
- § 10.4.2 The Contractor must promptly report in writing to the Construction Manager all emergencies whatsoever arising out of, or in connection with the performance of the Work, whether on, or adjacent to the site, which caused death, personal injury or property damages, giving full details and statements of witnesses. In addition, if death, injury, or damages are caused, the emergency shall be reported immediately to the Construction Manager, Owner, and Architect.
- § 10.4.3 In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.
- § 10.4.4 All fire and emergency access, including roads, rights-of-way, corridors, doors, and stairs, and all existing fire and smoke detection systems shall be maintained at all times in accordance with fire safety laws. If the Work requires the temporary obstruction of any fire and emergency access or existing fire and smoke detection systems, the Construction Manager shall be notified at least 72 hours in advance.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

- § 11.1.1 The Contractor agrees to secure and maintain, at the Contractor's own expense, all insurance coverage required in this Article 11 and elsewhere in the Contract Documents from one or more insurance companies licensed and admitted to write such insurance in New York State. Insurers must carry an A.M. Best A- rating or higher. The decision to accept non-licensed and non-admitted carriers lies exclusively with the Owner. The Contractor's insurance must include the following, without limitation, and must be written with limits no less than specified in Section 11.1.2:
 - .1 claims under workers' compensation, disability benefit, and other similar employee benefit acts applicable to the Work to be performed, including, without limitation, claims by the employees of private entities

- performing Work at the site that are exempt from workers' compensation insurance coverage requirements on account of number of employees or occupation, which entities must maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the Project;
- .2 claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 claims for damages because of bodily injury, sickness, disease, or death of any person other than the Contractor's employees;
- .4 claims for damages insured by usual personal injury liability coverage sustained (1) by a person as a result of an offense directly or indirectly related to employment of such person by the Contractor, or (2) by another person;
- .5 claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including resulting loss of use resulting;
- .6 claims for damages because of bodily injury, death of a person, or property damage arising out of ownership, maintenance, or use of a motor vehicle; and
- .7 claims involving contractual liability applicable to the Contractor's obligations under Section 3.18.
- .8 A fully completed New York Construction Certificate of Liability Insurance Addendum (Acord 855 2014/15) must be included with the certificates of insurance. For any "yes" answers on Items G through L on this Form additional details must be provided in writing. Policy exclusions may not be accepted.
- § 11.1.2 Coverages, whether written on an occurrence or claims-made basis, must 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. Claims-made coverage will only be allowed when the Contractor demonstrates that occurrence-based coverage is not available for a specific type of required coverage. The Contractor acknowledges that failure to obtain such insurance on behalf of the Owner constitutes a material breach of contract and subjects it to liability for damages, indemnification and all other legal remedies available to the Owner. The Contract shall indemnify the Owner for any applicable deductibles. The insurance required by Section 11.1.1 must be written for not less than the following limits, or greater limits as may be required by law, and include the following terms:
 - 11 Commercial General Liability. Occurrence-based Commercial General Liability coverage to include bodily injury, personal injury, and property damage applicable to ongoing operations, products & completed operations, and contractual liability, all with a per-project aggregate endorsement. No XCU exclusion is allowed for explosion, collapse, and underground operations. There will be no coverage restrictions and/or exclusions involving New York State Labor Law statutes or gravity related injuries. Products and Completed Operations coverage must be maintained in force for a minimum of three (3) years following Final Completion of the Project. Minimum limits are:

\$1,000,000 per Occurrence/\$2,000,000 Aggregate

\$2,000,000 Products and Completed Operations

\$1,000,000 Personal and Advertising Injury

\$100,000 Fire Damage

\$10,000 Medical Expense

The general aggregate shall apply on a per-project basis.

The commercial general liability policy shall be endorsed to waive the right of subrogation against the Owner and its Cooperative Board, employees and volunteers.

- .2 Automobile Liability. Bodily Injury and Property Damage coverage for the Contractor as the owner or lessee of automobiles, trucks, trailers, self-propelled Contractor's equipment, and all other owned and non-owned vehicles registered for use on the public highway and/or used in operations relating to the Contractor's Work, with a minimum Combined Single Limit of \$1,000,000. If any such vehicles are to be used to transport hazardous materials, the Contractor shall also provide pollution liability broadened coverage evidenced by ISO Form CA 99 48. The automobile liability policy shall be endorsed to waive the right of subrogation against the Owner and its Cooperative Board, employees and volunteers.
- .3 Excess Liability and/or Umbrella Liability. Minimum limits are:
 - .1 \$5 million each Occurrence and Aggregate for general construction and no work at elevation (1 story 10 feet) or project values less than or equal to \$1,000,000;
 - 2 \$10 million each Occurrence and Aggregate for high-risk construction, work at elevation (>1 story or 10 feet) or project values greater than \$1,000,000.

User Notes:

- Umbrella/Excess coverage shall be on a follow-form basis over the Auto Liability and General Liability coverages. The Umbrella/Excess liability policy shall be endorsed to waive the right of subrogation against the Owner and its Cooperative Board, employees and volunteers.
- .4 Workers' Compensation. Statutory Workers' Compensation (C-105.2 or U-26.3); and NYS Disability Insurance (DB-120.1) for all employees. Proof of coverage must be on the approved specific form, as required by the New York State Workers' Compensation Board. ACORD certificates are not acceptable. A person seeking an exemption must file a CE-200 Form with the state. The form can be completed and submitted directly to the WC Board online. The workers' compensation and employers' liability policies shall be endorsed to waive the right of subrogation against the Owner and its Cooperative Board, employees and volunteers.
- .5 Employer's Liability/Disability
 - 1 Disability Benefits Requirements. To comply with the New York State Disability Benefits Law, the Contractor must (1) be legally exempt from ing disability benefits insurance coverage, (2) obtain such coverage from insurance carriers, or (3) be self-insured.
 - 2 Disability Benefits Coverage Evidence. To demonstrate compliance with the New York State Disability Benefits Law, the Contractor must provide one of the following forms to the Owner:
 - .1 Either CE-200, "Affidavit For New York Entities And Any Out Of State Entities With No Employees, That New York State Workers' Compensation And/Or Disability Benefits Insurance Coverage Is Not Required" or CE-200, "Affidavit That An Out-Of-State Or Foreign Employer Working In New York State Does Not Require Specific New York State Workers' Compensation And/Or Disability Benefits Insurance Coverage" (either affidavit must be stamped as received by the New York State Workers' Compensation Board); or
 - **.2 Either** DB-120.1, "Certificate of Disability Benefits," or DB-820/829, "Certificate/Cancellation of Insurance" (the Contractor's insurance carrier must send either form to the Owner); or
 - .3 DB-155 (3/04), "Certificate of Disability Benefits Self-Insurance."

The employers' liability policies shall be endorsed to waive the right of subrogation against the Owner and its Cooperative Board, employees and volunteers.

- .6 Hazardous Materials. \$2,000,000 per occurrence/\$2,000,000 aggregate, including products and completed operations. Such insurance shall include coverage for the Contractor's operations including, but not limited to, removal, replacement, enclosure, encapsulation and/or disposal of asbestos, or any other hazardous material, along with any related pollution events, including coverage for third-party liability claims for bodily injury, property damage and clean-up costs. If a retroactive date is used, it shall pre-date the inception of the Contract.
 - If the Contractor is using motor vehicles for transporting hazardous materials, the Contractor shall maintain pollution liability broadened coverage (ISO Endorsement CA 9948), as well as proof of MCS 90. Coverage shall fulfill all requirements of these specifications and shall extend for a period of three (3) years following acceptance by the Owner of the Certificate of Completion. The pollution legal liability policy shall be endorsed to waive the right of subrogation against the Owner and its Cooperative Board, employees and volunteers.
- .7 Owner's Protective Liability Policy. For projects less than or equal to \$1,000,000 and work on 1 story (10 feet) only; \$1 million per occurrence, \$2 million aggregate with the Owner (OUBOCES) as the Named Insured. For projects greater than \$1,000,000 and/or work over 1 story (10 feet); \$2 million per occurrence, \$4 million aggregate with the Owner as the Named Insured. The XCU exclusion must be deleted. There will be no additional insureds on any OCP policies.
- § 11.1.3 Certificates of insurance acceptable to the Owner, together with copies of all insurance policies procured by the Contractor pursuant to this Article 11, including, without limitation, terms, conditions, declarations, riders, and endorsements, must be submitted to the Construction Manager for transmittal to the Owner, with copies to the Architect, prior to commencement of the Work. The certificate of insurance must describe the specific services provided by the contractor (e.g., roofing, carpentry, plumbing) that are covered by the liability policies. If any of the foregoing insurance coverages are required to remain in force after final payment, an additional certificate evidencing continuation of such coverage must be submitted with the final Application for Payment as required by Section 9.10.2.2. Information concerning reduction of coverage must be furnished by the Contractor with reasonable promptness. In addition to the Certificates of Insurance and accompanying documents, the Contractor shall provide to the Certificate Holders, on a timely basis, copies of any subsequently issued endorsements that amend any coverages or limits. In addition:

- "Certificate Holders" are the Orange Ulster BOCES, 53 Gibson Road, Goshen, New York 10924.
- Coverages reflected in certificates of insurance and underlying policies must comply with all requirements of this Article 11.
- All insurance documents must be executed with *authorized* signatures. .3
- All required liability policies must be endorsed to provide that any Notice of Cancellation or Notice of Non-Renewal given to the First Named Insured must also be given to the Additional Insureds identified in Section 11.1.4. Such endorsement shall provide that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been provided to the Owner. Copies of such endorsements must be furnished to the Certificate Holders.
- Failure of the Owner to object to the Contractor's failure to furnish a certificate or other evidence of required insurance coverages, or to object to any defect in such certificate or other evidence, or to demand receipt of such certificate or other evidence, is not a waiver of the Contractor's obligation to furnish the required insurance coverages. Furthermore, nothing contained in this Article 11 imposes on the Owner a duty or obligation to review any certificates or other evidence of insurance coverages or to issue any formal approval or acceptance of such evidence, the duty and obligation of the Contractor being to provide insurance meeting the requirements of this Article 11 regardless of any review or lack of review by the Owner of the Contractor's evidence of insurance.
- The Contractor's liability to and indemnification of the Owner is not relieved or diminished by the Contractor securing insurance coverage in accordance with this Article 11. Any acknowledgement of receipt of, or lack of objection by the Owner to, the Contractor's evidence of required insurance coverage is not acceptance in any way of any deficiencies in the Contractor's insurance coverage.

§ 11.1.4 Additional Insureds

§ 11.1.4.1 Notwithstanding any terms, conditions or provisions, in any other writing between the parties, the contractor hereby agrees to effectuate the naming of the Owner, Architect and Construction Manager as Additional Insureds on the Contractor's insurance policies, except for workers' compensation and N.Y. State Disability insurance. The additional insured coverage provided shall not preclude coverage in favor of the Owner, Architect or Construction Manager based on its lack of privity with the Contractor or other third party additional insured. Further, such coverage shall not exclude or deny coverage to the Additional Insureds on the basis that the named insured Contractor's Work or operations are not performed directly for the Owner, Architect, Construction Manager or other third party additional insured.

§ 11.1.4.2 Coverage Evidence. Additional Insured coverage shall be provided by ISO endorsement CG 20 10 11 85 or its equivalent. Examples of equivalent ISO additional insured endorsements include using both CG 20 33 10 01 and CG 20 37 10 01 together. Completed copies of all endorsements must be attached to the certificate of insurance. Certificates of Insurance must clearly state how coverage is effected in the Excess/Umbrella Liability layer. Certificates of Insurance must show the form numbers used to effect all of the Additional Insured coverages. A copy of the actual policy language or endorsement that effects this coverage in each policy must be provided to the Owner and Construction Manager with the Certificate of Insurance. The decision to accept an endorsement rests solely with the Owner.

§ 11.1.4.3 No Reliance on "Following Form." The Contractor acknowledges that "Following Form" wording generally does not meet the primary and non-contributory coverage requirement for Additional Insureds, and that the coverage primacy aspect of Additional Insured coverage is typically addressed in the "Other Insurance" provisions of a policy's "Conditions" section, and often requires an amending endorsement to effect coverage on a primary and non-contributory basis. The Contractor therefore must provide such endorsements to the Owner, or other documentation acceptable to the Owner evidencing that the primary and non-contributory coverage requirements are met as to all policies for which they are required under Section 11.4.1.1.

§ 11.1.5 Normal Expiration/Renewal. When any required insurance is to expire due to a normal expiration or renewal date, the Contractor shall supply the Owner, at least ten (10) days prior to either such date, in addition to Certificates of Insurance, with either (1) copies of all renewed insurance policies, including, without limitation, terms, conditions, declarations, riders, and endorsements evidencing continuation of all coverages in the same manner, limits of protection, and scopes of coverage as was provided by the previous policy, or (2) if acceptable to the Owner, all declaration pages, mandatory riders, and/or endorsements that clearly evidence the continuation of all coverages in the same manner, limits of protection, and scope of coverage as provided by the previous policy.

- § 11.1.6 Subcontractors. The Contractor shall cause each Subcontractor to (1) procure insurance reasonably satisfactory to the Owner and written by companies meeting the same criteria as required under Section 11.1.1, and (2) cause the issuers of those insurance policies to name the Additional Insureds as Additional Insureds under each Subcontractor's comprehensive general, automobile, excess/umbrella, and hazardous materials liability policies. The Additional Insured endorsement included in each such Subcontractor's policies must state that coverage is afforded to all Additional Insureds with respect to any and all claims arising out of operations performed by or on behalf of the Contractor. If the Additional Insureds have other insurance otherwise applicable to a loss, such other insurance will only apply, if at all, on an excess or contingent basis. The amount of each Subcontractor's insurers' liability under each such insurance policy will not be reduced by the existence of such other insurance. 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, its Cooperative Board, employees and volunteers from any and all claims for which the required insurance would have provided coverage. This indemnity obligation is in addition to any other indemnity obligation provided in the Contract Documents.
- § 11.1.7 Owner Insurer Loss Payments. In the event the Owner's insurer(s) make(s) any payment toward any loss covered under any policy of insurance the Contractor is required to procure under this Article 11, the Owner's insurer(s) are subrogated to all of the Contractor's rights of recovery against any person or organization including, but not limited to, the Contractor's insurer(s), and the Contractor shall execute and deliver all instruments, papers, and whatever else is necessary to secure those rights. The Contractor shall do nothing after the payment of any damages to prejudice those rights.
- § 11.1.8 Waiver of Subrogation. All insurance policies maintained by the Contractor shall include a waiver of any and all rights of subrogation of the Contractor or its Insurers against the Owner, State of New York, Construction Manager and Architect, along with all other Additional Insureds/Indemnified Parties and their agents, officers, directors and employees for recovery of damages. The Contractor further waives its right of subrogation against the Owner and any Additional Insured or Indemnified Party for any damage or loss to the Contractor's scope work, tools, equipment, materials or any other loss within the scope of any insurance maintained by the Owner.

§ 11.2 Owner's Liability Insurance

The Owner shall purchase and maintain the Owner's usual liability insurance. The Owner may also, at its sole option, purchase and maintain other insurance for protection against claims that may arise from operations under the Contract Documents. The Contractor is not responsible for purchasing and maintaining such optional Owner's liability insurance unless specifically required in the Contract Documents. Neither the Owner's usual liability insurance nor any other insurance obtained by the Owner reduces or otherwise affects the Contractor's insurance requirements under Section 11.1.

(Paragraphs deleted)

§ 11.3 Property Insurance

- § 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the State of New York, property insurance on a replacement cost basis. Such property insurance will be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment is made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance will include interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project.
- § 11.3.1.1 Property insurance will be on a builder's risk, "all-risk," or equivalent policy form and include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings, and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and will cover reasonable compensation for the Architect's, Contractor's, and Construction Manager's services and expenses required as a result of such insured loss. Coverage for other perils is not required unless otherwise provided in the Contract Documents. The form of policy for this coverage shall be Completed Value. Notwithstanding the definition of the "Work" in this Contract or in this Section 11.3.1.1, the Contractor assumes all responsibility for the safety and keeping of all tools and equipment and any materials or products used to complete or perform the Work, and which do not form a permanent part of the Work. The Contractor waives all rights against the Owner, Construction Manager and Architect, their consultants, sub-consultants,

employees and agents for any loss or damages to any such tools, equipment or any material or products used to complete or perform the Work, and which do not form a part of the Work. The Contractor shall require similar waivers in favor of the above-named parties from all Subcontractors and Sub-subcontractors, agents and employees of any of them.

- § 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner.
- § 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.
- § 11.3.1.4 The property insurance will cover portions of the Work stored off the site, and also portions of the Work in transit. The insurance required by this Section 11.3 will not, however, cover machinery, tools, equipment, vehicles, shanties, tool houses, trailers, or other temporary or permanent structures owned or rented by the Contractor, a Subcontractor, or a Sub-subcontractor, or their employees, utilized in performance of the Work but not incorporated into the permanent improvements. The Contractor is solely responsible for all such items of its own and any under its control. The Contractor shall, at the Contractor's own expense, provide insurance coverage for all of the items described in this Section 11.3.1.4, which is subject to the provisions of Section 11.3.7.
- § 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 may not commence until the insurance company or companies providing property insurance consent to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance.
- § 11.3.1.6 The Owner shall not be responsible to or for the Contractor or Subcontractor against any loss by fire, lightning, extended coverage, all risk, theft or vandalism and malicious mischief, or any tools, equipment, vehicles, shanties, tool houses, trailers or other temporary or permanent structures wherever located and owned by the Contractor, Subcontractors, their employees or agents.
- § 11.3.1.7 The form of policy for the coverage required by 11.3.1 shall be Completed Value.
- § 11.3.2 Boiler and Machinery Insurance. The Owner, if applicable to the Work and at its sole option, may purchase and maintain boiler and machinery insurance or shall do so if required by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner. This insurance will include interests of the Owner, Construction Manager, Contractor, Subcontractors and Sub-subcontractors in the Work.

§ 11.3.3 Intentionally omitted.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described in this Section 11.3 or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost for it will be charged to the Contractor by appropriate Change Order.

§ 11.3.5 Intentionally omitted.

- § 11.3.6 Upon the Contractor's request, the Owner will provide copies of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project.
- § 11.3.7 Waivers of Subrogation. The Owner and Contractor waive all rights against (1) each other and any of their respective subcontractors, sub-subcontractors, agents and employees, and (2) the Construction Manager, Construction Manager's consultants, Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their respective subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire or other causes of loss to the extent of proceeds under property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as the Owner and Contractor may have to the proceeds

of such insurance held by the Owner. The Owner or Contractor, as appropriate, shall require of the Construction Manager, Construction Manager's consultants, Architect, Architect's consultants, Owner's separate contractors described in Article 6, if any, and any of their respective subcontractors, sub-subcontractors, agents, and employees, by appropriate written agreements, similar waivers each in favor of other parties enumerated in this Section 11.3.7. The policies must provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation is effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity has an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the property insurance will be adjusted by the Owner and made payable to the Owner for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.8.1. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate written agreements shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.8.1 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

§ 11.4

(Paragraphs deleted)

Performance Bond and Payment Bond

§ 11.4.1 The Contractor shall furnish performance and labor and material payment bonds, each in an amount equal to one hundred percent (100%) of the Contract Sum, meeting all statutory requirements of the State of New York, in form and substance satisfactory to the Owner in its sole discretion and, without limitation, complying with the following specific requirements:

- The prescribed form of the performance and payment bonds shall conform to AIA A312-2010, and other shall be satisfactory to the Owner in the Owner's sole judgment;
- .2 The cost of the required bonds shall be included in the Contract Sum;
- Bonds shall be executed by a responsible surety licensed in New York State, listed in the latest issue of the U.S. Treasury Circular 570 and having an A.M. Best's rating of no less than A-/IX and shall remain in effect for a period not less than two years following the date of Substantial Completion or the time required to resolve any items of incomplete Work and the payment of any disputed amounts, whichever time period is longer;
- The Contractor shall require the attorney in fact who executes the required bond on behalf of the surety to affix thereof a certified and current copy of his power of attorney indicating the monetary limit of such power. The signatures of the Contractor and Surety shall be acknowledged by a notary public;
- Every bond under this Section 11.4.1 shall name Orange Ulster BOCES as the obligee and must display the surety bond number.
- § 11.4.2 A rider including the following provisions shall be attached to each bond:
 - 1. This bond includes performance by the Contractor of any correction and warranty obligations in the Contract Documents, including such performance after the dates of Substantial Completion and final completion.
 - 2. 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.
- 3. Surety further agrees that in event of any default by the Owner in the performance of the Owner's obligations to the Contractor under the Contract, the Contractor or Surety shall cause written notice of such default (specifying said default in detail) to be given to the Owner, and the Owner shall have thirty (30) days from time after receipt of such notice within which to cure such default, or such additional reasonable period of time as may be required if the nature of such default is such that it cannot be cured within thirty (30) days. Such Notice of Default shall be sent by certified or registered U.S. Mail, return receipt requested, first class postage prepaid, to the Owner.
- § 11.4.3 All bonds shall be maintained in full force during the duration of the Project and for a period of two (2) years after the date of the Contractor's acceptance of final payment as guarantee that the Contractor will make good any faults or defects in the work arising from improper or defective workmanship or materials which may appear during the comeback warranty period.
- § 11.4.4 The Contactor shall deliver the required bonds to the Owner prior to beginning construction activity at the Project site, but no later than seven (7) days after execution of the Contract.
- § 11.4.5 The Owner may, in the Owner's sole discretion and without prior notice to the Contractor, inform surety of 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.
- § 11.4.6 If the surety on any Bond furnished by the 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.
- § 11.4.7 The Contractor shall keep the surety informed of the progress of the Work, and, where necessary, obtain the surety's consent to, or waiver of: (1) notice of changes in the Work; (2) request for reduction or release of retention; (3) request for final payment; and (4) any other material required by the surety. The Owner shall be notified by the Contractor, in writing, of all communications with the surety. The Owner may, in the Owner's sole discretion, inform the surety of the progress of the Work and obtain consents as necessary to protect the Owner's rights, interest, privileges and benefits under any pursuant to any bond issued in connection with the Work.
- § 11.4.8 Notwithstanding any other provisions in any performance or payment bond, it shall not be a condition precedent to termination of a Contract or Contractor that notice be sent to or meeting be arranged or held with the Contractor (principal) and surety, prior to such termination. Any such requirement(s) shall be void and unenforceable and the Owner shall have the right to reject any such bond(s) or ignore such condition. The exclusive method of termination of a Contract or the Contractor is contained in the Contract Documents, and the Contractor and surety expressly agree to be bound thereby.
- § 11.4.9 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.
- § 11.4.10 The Contractor shall provide for the continuation of the performance bond as a maintenance bond for two (2) full years after the date of final payment request at the full final Contract Sum.
- § 11.5 Neither the procurement nor the maintenance of any type of insurance by the Owner or the Contractor shall in any way be construed or be deemed to limit, discharge, waive or release the Contractor from any of the obligations and risks imposed upon him by the Contract or to be a limitation on the nature or extent of such obligations or risks.

(Paragraphs deleted)

§ 11.6 Nothing in the Contract shall create or give to third parties any claim or right of action against the Contractor, Architect, Construction Manager or Owner beyond such as may legally exist irrespective of the Contract.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Construction Manager's or Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by either, be uncovered for their examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered which the Construction Manager or Architect has not specifically requested to observe prior to its being covered, the Construction Manager or Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or one of the other Contractors in which event the Owner shall be responsible for payment of such costs.

§ 12.2 Correction of Work

§ 12.2.1 Before or After Substantial Completion

The Owner, through its Architect or Construction Manager, shall have the authority to reject Work performed by the Contractor that does not conform to the requirements of the Drawings, Specifications, or both. The Contractor shall promptly correct Work rejected by the Construction Manager or Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 If, within two (2) years after the date of Substantial Completion of the Work or a designated portion of the Work, or the date of acceptance of a portion of the Work that is subject to correction or completion after the date of Substantial Completion of the Work, whichever is later, or after the date for commencement of warranties established under Section 9.8.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The obligation set forth hereunder shall survive acceptance by the Owner of the Work or termination of the Contract. The Owner shall give such notice promptly after discovery of the condition. The Contractor's Performance Bond shall remain in full force and effect through this two-year comeback correction period.

- § 12.2.2.2 The two-year period for correction of the Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.
- § 12.2.2.3 Upon completion of any Work under or pursuant to this Section 12.2, the two-year period for correction of Work in connection with the Work requiring correction shall be renewed and recommence.
- § 12.2.2.4 The obligations shall cover any repair and replacement to any part of the Work or other property caused by the defective or nonconforming Work.
- § 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.
- § 12.2.3.1 If the Contractor fails to commence to correct, repair and make good any defects in its Work within a reasonable time, not to exceed ten (10) days from the date the Contractor received written notice from the Owner per Section 12.2.2.1, the Owner may correct it in accordance with Section 2.5 and the Contractor shall, upon demand, pay to the Owner all amounts which it expends for such corrective work.
- § 12.2.3.2 In emergencies occurring during the two-year correction period, the Owner may correct any defect immediately and charge the cost to the Contractor. The Owner shall at once notify the Contractor, who may take over the

Work and make any corrections remaining after its forces arrive at the Work. Repair work not started within ten (10) days following notice to the Contractor of any defect may be considered an emergency.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner, Multiple Prime Contractors or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents. The Contractor shall also replace or repair to satisfaction of Owner any and all damage done to the building or its contents in consequence of work performed in fulfilling any applicable warranty. This clause is general in nature and will not operate to waive stipulations of other clauses that specify warranty periods in excess of two (2) years.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the two-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as determined by the Owner, with the advice of the Construction Manager and Architect. Such adjustment shall be effected whether or not final payment has been made. For this Section to apply, the Owner must accept non-conforming Work in writing specifying the non-conforming Work being accepted. Notwithstanding any acceptance by the Owner, if the Owner discovers non-conforming Work that the Owner has not expressly accepted in writing, the Owner may demand that the Contractor correct such Work as per the provisions of Article 12 hereof.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the State of New York, and the parties expressly agree that any claim, dispute, or other controversy of any nature arising out of the Contract or performance of the Work shall be commenced and maintained in New York State Supreme Court, Orange County.

§ 13.1.2 The Contractor shall at all times observe and comply with all federal, state and local 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 defend, indemnify and save harmless the Owner and its Cooperative Board, 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. 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 the Agreement 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.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

- § 13.3.2 Neither the acceptance of all or any part of the work covered by the Contract; nor any payment therefore; nor any order or application for payment issued under the Contract or otherwise issued by the Owner, Architect, Construction Manager, or any board member, officer, agent or employee of the Owner; nor any permission or direction to continue with the performance of the Contract before or after its specified completion date; nor any performance by the Owner of any of the Contractor's duties or obligations; nor any aid lent to the Contractor by the Owner in its performance of such duties or obligations; nor any delay or omission by the Owner to exercise any right or remedy accruing to it under the terms of the Contract or existing at law or in equity or by statute or otherwise; nor any other thing done or omitted to be done by the Owner, its commissioners, officers, agents or employees; shall be deemed to be a release to the Contractor or its sureties from any obligations, liabilities or undertakings in connection with the Contract or the performance bond or a waiver of any provision of the Contract or of any rights or remedies to which the Owner may be entitled because of any breach thereof, excepting only a written instrument expressly providing for such release or waiver. No cancellation, rescission or annulment hereof, in whole or as to any part of the Contract, because of any breach hereof, shall be deemed a waiver of any money damages to which the Owner may be entitled because of such breach. No waiver by the Owner of any breach of the Contract shall be deemed to be a waiver of any other or any subsequent breach.
- § 13.3.3 The rights stated in these General Conditions and the Contract Documents are cumulative and not in limitation of any rights of the Owner at law or in equity.
- § 13.3.4 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.
- § 13.3.5 The Owner shall not be liable to the Contractor for punitive damages on account of its termination of the Contractor or any other alleged breach of the Agreement and the Contractor hereby expressly waives its right to claim such damages against the Owner.
- § 13.3.6 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.
- § 13.3.7 The Contractor agrees that it waives the defense of privity of contract as between itself and each other Prime Contractor. In the event that an act or omission by a Prime Contractor or its Subcontractors of any tier causes impact, damage or loss in any form to the Contractor, then the Prime Contractor responsible in whole or in part for such impact, damage or loss agrees it is directly responsible and liable to the Contractor. The Contractor acknowledges and agrees that this waiver of the defense or privity of contract permits and requires it to commence an action or suit directly against the responsible Prime Contractor. The Owner, Architect and the Construction Manager shall not be parties to such suit. The Contractor waives and relinquishes any right and claim as against the Owner, to the extent such claim is caused, or contributed to, by a Prime Contractor or its Subcontractors of any tier.

§ 13.4 Tests and Inspections

- § 13.4.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Tests, inspections and approvals of portions of the Contractor's Work required by the Drawings or Specifications shall be made at an appropriate time. Unless otherwise provided, the Contractor shall arrange for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Construction Manager and Architect timely notice of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.
- § 13.4.2 If the Construction Manager, Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.4.1, the Construction Manager or Architect shall, upon written authorization from the Owner, instruct the Contractor to

arrange for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Construction Manager and Architect of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

- § 13.4.3 If such procedures for testing, inspection or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Construction Manager's and Architect's services and expenses shall be at the Contractor's expense, including the cost of retesting for verification of compliance if necessary until the Architect certifies that the Work in question does comply with the requirements of the Contract Documents, and none of such costs shall be included in computing the Contract Sum.
- § 13.4.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Construction Manager for transmittal to the Architect.
- § 13.4.5 If the Construction Manager or Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Construction Manager or Architect will do so promptly and, where practicable, at the normal place of testing.
- § 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.
- § 13.4.7 Any material to be furnished shall be subject to inspections and tests in the shop and field by the Architect. Shop inspection shall not relieve the Contractor of the responsibility to furnish satisfactory materials and the right is reserved to reject any material at any time before final acceptance of the Work, when in the opinion of the Architect the materials and/or workmanship do not conform to the Specification requirements.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the legal rate as required in General Municipal Law Section 106-b.

§ 13.6 Time Limits on Claims

- § 13.6.1 No action or proceeding shall lie or be maintained by the Contractor, nor anyone claiming under or through the Contractor, against the Owner upon any claim arising out of or based on the Agreement or the Contract Documents or by reason of any act or omission or requirements relating to the giving of notices and information, unless such action or proceeding shall be commenced within one (1) year after submission to the Owner of the final Application for Payment. As to a claim based upon money required to be retained for any period after the date of the final Application for Payment, such action must be commenced within six (6) months after such money becomes due and payable under the terms of the Contract. Notwithstanding, if the Contract is terminated by the Owner, any action or proceeding by the Contractor must be commenced within six (6) months after the date of such termination. The Contractor's acceptance of final payment shall constitute a release of all claims against the Owner. This provision shall not relieve the Contractor of the obligation to comply with the provisions of the law relating to notices of claim.
- § 13.6.2 Acts or failures to act occurring during the construction of the Project or following the issuance of the final certificate for payment, which give rise to a 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 any warranty provided under Section 3.5, the date of any correction of the Work or failure to correct the Work by the Contractor under Section 12.2, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor, whichever occurs last.

§ 13.7 No Oral Waiver or Constructive Changes

The provisions of the Contract Documents shall not be changed, amended, waived, or otherwise modified in any respect except by a writing signed by the Owner. No person is authorized on behalf of the Owner to orally change, amend, waive, or otherwise modify the terms of the Contract Documents or any of the Contractor's duties or obligations under or arising out of the Contract Documents. Any change, waiver, approval, or consent granted to the Contractor shall be limited to the specific matters stated in the writing signed by the Owner, and shall not relieve the Contractor of any other of the duties and obligations under the Contract Documents. No "constructive" changes shall be allowed.

§ 13.8 Notices Regarding Liens

The Contractor shall provide to the Owner copies of all notices of any type regarding liens received from Subcontractors, Sub-subcontractors, or suppliers to the Contractor.

§ 13.9 Wages Rates

The Contractor shall, and cause its Subcontractors to, comply with prevailing wage rate determinations as issued by the State of New York Department of Labor for the location and duration of this Project. Current wage rates for this Project are included in the Project Manual.

§ 13.10 General Provisions

Any specific requirement in this Contract that the responsibilities or obligations of the Contractor also apply to a Subcontractor is added for emphasis and is also hereby deemed to include a Subcontractor of any tier. The omission of a reference to a Subcontractor in connection with any of the Contractor's responsibilities or obligations shall not be construed to diminish, abrogate or limit any responsibilities or obligations of a Subcontractor of any tier under the Contract Documents or the applicable subcontract.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

- § 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 90 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:
 - Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be
 - .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped; or
 - .3 Because the Construction Manager has not certified or the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4 and 9.5, or because the Owner has not made payment after 14 days written notice of such failure to make payment provided that such failure is not due to a disputed amount, and except to the extent the Owner is excused from timely making all or part of any payment on a Certificate for Payment as per any other provisions of the Contract Documents.

Notwithstanding the preceding or anything else in the Contract Documents, the Contractor shall not cease or delay the progress of the Work for any reason other than one set forth in Section 9.7.1, it being agreed that monetary damages shall be an adequate remedy for the Contractor for any breach of this Agreement or the Contract Documents by the Owner.

- § 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion.
- § 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon 30 days' written notice and opportunity to cure to the Owner, terminate the Contract and recover from the Owner payment for such Work properly performed for which it has not otherwise been compensated, but in no event shall the Owner be liable to the Contractor for any prospective loss, including, but not limited to, termination expenses, loss of anticipated profits, impact damages, unabsorbed overhead, or the like. Notwithstanding the foregoing, any such payments to the Contractor shall be less any setoffs to which the Owner may be entitled as per any other provision of the Contract Documents.
- § 14.1.4 If the Work is stopped for a period of 90 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon 30 additional

days' written notice to the Owner, Construction Manager and Architect (during which the Owner shall have the right and opportunity to cure), terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

- § 14.2.1 The Owner may terminate the Contract if the Contractor
 - refuses or fails to supply enough properly skilled workers or proper materials or equipment to complete the Work in a diligent, efficient, timely, workmanlike, skillful, and careful manner;
 - .2 fails to make payment to Subcontractors or Suppliers for materials or labor in accordance with the respective agreements between the Contractor and its Subcontractors or Suppliers;
 - .3 disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority, or its health and safety plan;
 - otherwise is guilty of substantial breach of or default under a provision of the Contract Documents; .4
 - .5 cannot complete the Work within the Contract Time or within the time to which such completion may have been extended; provided, however, that the impossibility of timely completion is, in the Owner's opinion, attributable to conditions within the Contractor's control;
 - .6 breaches any warranty made by the Contractor under or pursuant to the Contract Documents;
 - .7 is or has been unnecessarily or unreasonably or willfully delaying the performance and completion of the Work, or the award of necessary subcontracts, or the placing of necessary material and equipment orders:
 - .8 fails to furnish the Owner with assurances satisfactory to the Owner evidencing the Contractor's ability to complete the Work in compliance with all requirements of the Contract Documents;
 - .9 refuses to proceed with the Work or extra work when and as directed by the Owner, Construction Manager or Architect;
 - .10 fails after commencement of the Work to proceed continuously with the construction and completion of the Work for more than 10 days, except as permitted under the Contract Documents;
 - fails or neglects to complete the Work within the Contract Time or in accordance with the Construction Schedule:
 - .12 refuses or fails to correct deficient Work performed by it;
 - the Contractor's progress of the Work is such that the Owner reasonably believes that the Contractor shall not be able to achieve Substantial Completion by the Substantial Completion Date and the Contractor has not delivered and implemented a recovery plan required under the Contract or has not recovered the schedule sufficient to meet the respective Contract Time requirements as required by written notice to the Contractor by the Owner; or
 - .14 disregards the instructions of the Construction Manager, Architect or Owner (when such instructions are based on the requirements of the Contract Documents).
- § 14.2.2 When any of the above reasons exist, the Owner may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven (7) days' written notice, terminate employment of the Contractor at the expiration of such seven (7) day period, and may, subject to any prior rights of the surety:
 - Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor and take possession of materials stored off-site by the Contractor;
 - Accept assignment of subcontracts pursuant to Section 5.4; and .2
 - Finish the Work by whatever reasonable method the Owner may deem expedient utilizing for such purpose such of the Contractor's plant, materials, equipment, tools and supplies remaining on the site, and also such subcontractors as it may deem advisable, or if may call upon the Contractor's surety at its own expense to do so. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work. Such accounting shall be final, binding and conclusive upon the Contractor, its surety, and any person claiming under or through the Contractor, as to the amount thereof.
- § 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.
- § 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, and other damages

incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall, upon application, be certified by the Initial Decision Maker after consultation with the Construction Manager, and this obligation for payment shall survive termination of the Contract.

- § 14.2.4.1 The costs of finishing the Work also include, without limitation, all reasonable attorneys' fees incurred in responding to the default and enforcing the Owner's rights and remedies under the Contract Documents, additional title costs, insurance, additional interest because of any delay in completing the Work, loss of State Building Aid, and all other direct and consequential damages incurred by the Owner by reason of the termination of the Contractor as stated herein.
- §14.2.4.2 It is recognized that: (1) if an order for relief is entered on behalf of Contractor pursuant to Title 11 of the United States Code, (2) if any other similar order is entered under any other debtor relief laws, (3) if Contractor makes a general assignment for the benefit of its creditors, (4) if a receiver is appointed for the benefit of its creditors, or (5) if a receiver is appointed on account of its insolvency, any such event could impair or frustrate Contractor's performance of the Contract. Accordingly, it is agreed that upon the occurrence of any such event, 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 the Contract. Failure to comply with such request within ten (10) days of delivery of the request, or Owner's determination that the assurances are not adequate, shall entitle Owner to terminate the Contract and to the accompanying rights set forth in Subparagraphs 14.2.1 through 14.2.4 hereof. In all events pending receipt of adequate assurance of performance and actual performance in accordance therewith, Owner shall be entitled to proceed with the 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 Contract Sum.
- § 14.2.5 If the Owner wrongfully terminates the Contract for cause, the rights, remedies and obligations of the parties will be the same as if the Owner had terminated the Contract for convenience under Section 14.4.
- § 14.2.6 In the event that the Contractor, or the Contractor's surety, challenges the Owner's termination of the Contract for cause, and the Owner prevails in litigation in connection with such challenge, whether initiated by the Owner or by the Contractor or the Contractor's surety, the Owner shall be entitled to its costs, including reasonable attorney's fees, incurred as a result of such litigation, as part of any judgment against the Contractor or the Contractor's surety. Such costs, including reasonable attorney's fees, shall be deemed a cost of finishing the Work.

§ 14.3 Suspension by the Owner for Convenience

- § 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine. The Owner shall incur no liability by reason of such suspension, delay, or interruption except that the Contractor may request an extension of its time to complete its Work in accordance with Article 8 hereof.
- § 14.3.2 The Contract Time shall be adjusted for increases in time caused by suspension, delay or interruption as described in Section 14.3.1. No adjustment shall be made to the extent:
 - that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
 - that an equitable adjustment is made or denied under another provision of this Contract.

§ 14.4 Termination by the Owner for Convenience

- § 14.4.1 The Owner may, at any time, terminate the whole or any portion of the Contract for the Owner's convenience and without cause upon not less than seven (7) days' written notice to the Contractor. Notwithstanding any other provision to the contrary in the Contract, the Owner reserves the right at any time and in its absolute discretion to terminate the services of the Contractor or the Work by giving written notice to the Contractor. This termination for convenience of the Owner provision allows and authorizes the Owner to terminate this Contract at any time and for any reason whatsoever. This right may be exercised by the Owner in its complete discretion. Termination by the Owner under this Section shall be by Notice of Termination delivered to the Contractor specifying the extent of termination and the effective date.
- § 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall immediately and in accordance with instructions from the Owner:

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work;
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders; and
- .4 proceed to complete the performance of the Work required under portions of the Contract not terminated, if any.

§ 14.4.3 Upon receipt of written notice of the Owner's exercise of such termination, the Contractor shall, as the Contractor's sole and exclusive remedy, be paid for the Work properly executed in accordance with the Contract Documents prior to the effective date of termination and for items properly fabricated off-site, delivered and stored in accordance with the Owner's instructions or the Contract Documents before such effective date. The Contractor's entitlement to payment for all such work shall be predicated on its performance of such work in accordance with the Contract Documents as certified by the Architect and Construction Manager. The Contractor shall be entitled to no other payment and waives any claim for damages including, but not limited to, lost profits, any prospective loss, underutilization of personnel or equipment, unabsorbed overhead, and any and all items of consequential loss or damage. The Owner shall be entitled to credit against any payment to be made to the Contractor pursuant to this Section 14.4 the following: (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 Documents; and (3) the value of the materials, supplies, equipment, or other items that are to be disposed of by the Contractor, the cost of which is included in the Contract Sum. Notwithstanding the foregoing, in the event of a termination under Section 14.4.1 prior to the issuance of a Notice to Proceed, the Contractor shall not be entitled to any compensation whatsoever.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. Neither a Request for Information, nor a Construction Change Directive, nor a Change Order, nor a reservation of rights, nor minutes of a meeting, nor a daily report, nor any log entry, nor an Owner's request for or the Contractor's response to a Change Order proposal, nor notice of a potential or future claim shall constitute a Claim.

§ 15.1.2 Time Limits on Claims

(Paragraph deleted)

§ 15.1.2.1 Claims by the Contractor must be initiated by written notice to the Owner and the Initial Decision Maker. Claims by the Contractor must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the Contractor first recognizes the condition giving rise to the Claim, whichever is earlier.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by the Contractor must be initiated by written notice to the Owner and to the Architect with a copy sent to the Construction Manager within the time limits set forth in Section 15.1.2.1 above. The purpose of the written notice is to give the Owner prompt opportunity: (a) to cancel or revise orders or directions, change plans, mitigate or remedy circumstances giving rise to the Claim or to take other action that may be desirable; (b) to monitor and verify the facts and circumstances as they occur; and (c) to verify any costs and expenses claimed by the Contractor contemporaneously as they are incurred. Written notice is required whether or not the Owner, Construction Manager or Architect is aware of the facts or circumstances that constitute the basis for the Contractor's Claim, and no action or conduct of the Owner, Construction Manager, Architect or any other person will be regarded as a waiver of such notice requirement except only a written statement to such effect signed by the Owner. Failure of the Contractor to give written notice as required by this Section shall be deemed conclusively to be a waiver and release of any Claim, and such written notice shall be a condition precedent to the Contractor's right to make any Claim arising out of, under or in connection with the Contract or its performance of the Work.

§ 15.1.3.2 Written notice shall contain a heading stating "Notice of Claim" to clearly identify it as such. Such notice shall set forth in detail the circumstances that form the basis for the Claim and shall include the following: (1) a clear statement of the claim, including background and chronology; (2) documentation in support of the claim; (3) documentation in support of claimed damages; and (4) certification by responsible officer of the Contractor. The

responsibility to substantiate Claims shall rest with the Contractor. An additional Claim arising from the same occurrence or condition made after the Initial Claim has been implemented by Change Order shall not be considered.

§ 15.1.3.3 The Contractor agrees that it has and will make no claim for damages against the Owner by reason of any act or failure to act by any other Contractor, Separate Contractor or Subcontractors having contracts for performance of any portion of work of the Project or in connection with the Owner's, Architect's or Construction Manager's acts or omissions to act in connection with such other Contractors, Separate Contractors or Subcontractors.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim by the Contractor, except as otherwise agreed in writing or as provided in Section 9.7, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments of undisputed amounts in accordance with the Contract Documents; provided, however, that the Contractor shall use its best efforts to furnish the Architect and Owner, as expeditiously as possible, with notice of any Claim including, without limitation, those in connection with concealed or unknown conditions, once such Claim is recognized, and shall cooperate with the Architect and the Owner in any effort to mitigate the alleged or potential damages, delay or other adverse consequences arising out of the condition which is the cause of such a Claim. The Construction Manager will prepare Change Orders and the Architect will issue a Certificate for Payment or Project Certificate for Payment in accordance with the decisions of the Initial Decision Maker.

(Paragraph deleted)

§ 15.1.5 Claims for Additional Cost. If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.3. The Contractor agrees that an express condition precedent to the Contractor's entitlement to any increase in the Contract Sum shall be full and complete compliance to the satisfaction of the Owner with the requirements of Article 15. The Contractor acknowledges the no damages for delay provisions set forth in Sections 8.3.2 and 15.1.6.1.4 hereof.

- § 15.1.5.1 The Contractor shall not be entitled to any adjustment in the Contract Sum or Contract Time if:
 - The Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner in respect of Contract Sum and Contract Times by the submission of a bid or becoming bound under a negotiated contract; or
 - .2 The existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test or study of the site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for the Contractor prior to Contractor's making such final commitment;
 - .3 The Contractor failed to give the written notice within the time and as required by Section 15.1.2; or
 - .4 If the Owner and the Contractor are unable to agree on entitlement to or as to the amount or length of any such equitable adjustment in the Contract Sum or Contract Times, a claim may be made therefore as provided in Article 15. However, the Owner, Construction Manager, and Architect shall not be liable to the Contractor for any claims, costs, losses or damages sustained by the Contractor on or in connection with any other project or anticipated project.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Sections 15.1.2 and 15.1.3 shall be given. The Contractor's Claim shall include an estimate of the probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary.

§ 15.1.6.1.1 An application for extension of time must set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work and the number of days' increase in the Contract Time claimed as a consequence of each such cause of delay. The Contractor shall provide such supporting documentation as the Owner, Construction Manager or Architect may require including, where appropriate, a revised construction schedule indicating all the activities affected by the circumstances forming the basis of the Claim for an increase in the Contract Time.

- § 15.1.6.1.2 The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Contractor.
- § 15.1.6.1.3 The Contractor agrees that an express condition precedent to the Contractor's entitlement to any extension of the Contract Time shall be full and complete compliance to the satisfaction of the Owner with the requirements of Articles 8 and 15.
- § 15.1.6.1.4 The Owner shall not be liable to the Contractor or any of its Subcontractor for claims, impact costs, extended general conditions, unabsorbed overhead, or delay damages of any nature caused by or arising out of delay, disruption, interference, inefficiencies, impedance, hindrance, acceleration, resequencing, schedule impacts, lack of timeliness by the Owner or its Architect or Construction Manager, and lack of coordination or scheduling, cumulative impact of multiple change orders, errors or omissions in the design of the Project, delay and other performance impacts. The sole remedy against the Owner for such delays shall be the allowance of additional time for completion of the Work, the amount of which shall be subject to the Claims procedure set forth herein. Except to the extent, if any, expressly prohibited by law, the Contractor expressly agrees not to make and hereby waives any claim for damages for delay, including, but not limited to, those resulting from increased labor or material costs, extended general conditions, directions given or not given by the Owner, Construction Manager, or Architect, including scheduling and coordination of the Work; the Architect's preparation of drawings and specifications or the Construction Manager's or Architect's review of shop drawings and requests for instructions; errors or omissions in the design of the Project; or, on account of any delay, disruption, interference, impedance, inefficiency, lack of productivity, obstruction or hindrance for any cause whatsoever by the Owner, Construction Manager, Architect or any other Contractor or Separate Contractor on the Project whether or not foreseeable or anticipated. The Contractor agrees that its sole right and remedy therefore shall be an extension of time, if appropriate. It is emphasized that no monetary recovery may be obtained by the Contractor for delay against the Owner, Construction Manager, Architect, other Contractor or Separate Contractor based on any reason and that the Contractor's sole remedy, if appropriate, is additional time.
- § 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction. In planning his construction schedule within the agreed Contract Time, it shall be assumed that the Contractor has anticipated the amount of adverse weather conditions normal to the site of the Work for the season or seasons of the year involved. Only those weather delays attributable to other than normal weather conditions will be considered by the Architect.
- § 15.1.7 Waiver of Claims for Consequential Damages. The Contractor waives any and all claims for consequential damages of any kind and nature arising out of or relating to this Contract. This (Paragraphs deleted)

waiver includes, without limitation, damages incurred by the Contractor for principal office expenses including compensation for personnel stationed there, unabsorbed overhead, for losses of financing, business and reputation, and loss of profit and anticipated profit. This waiver of consequential damages shall survive termination of the Contract.

§ 15.2 Initial Decision

- § 15.2.1 Claims by the Contractor, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims by the Contractor excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to binding dispute resolution of any Claim. If an initial decision has not been rendered within 30 days after the Contractor's Claim has been referred to the Initial Decision Maker, the Contractor may proceed with binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.
- § 15.2.2 The Initial Decision Maker will review Claims by the Contractor and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker

concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

- § 15.2.3 In evaluating Claims by the Contractor, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.
- § 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim by the Contractor or to furnish additional supporting data, such party shall respond, within 10 days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim by the Contractor in whole or in part.
- § 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim by the Contractor, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect and Construction Manager, if the Architect or Construction Manager is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to binding dispute resolution.
- § 15.2.6 Intentionally omitted.
- § 15.2.6.1 Intentionally omitted.
- § 15.2.7 Intentionally omitted.
- § 15.2.8 If a Claim by the Contractor relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

ARTICLE 16 SPECIAL CONDITIONS

§ 16.1 Equal Opportunity

- § 16.1.1 The Contractor shall maintain policies for equal employment opportunity for construction employment. During performance of the Agreement, the Contractor agrees as follows:
- § 16.1.2 The Contractor and its 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 ensure that all 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 and on-the-job training.
- § 16.1.3 The Contractor will post and keep posted in conspicuous places, for employees and applicants for employment, notices obtained by the Contractor from the New York State Division of Human Rights as set forth in the General Regulations of that Division at 9 NYCRR 466.1(a), such conspicuous places to be as defined in 9 NYCRR 466.1(b), and such other postings as that Division may require with respect to New York State's laws, codes, rules, and regulations governing discrimination in employment.
- § 16.1.4 The Contractor will state in all solicitations or advertisements for employees placed by, or on behalf, of the Contractor, that all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color or national origin.
- § 16.1.5 The Contractor will comply with provisions of Sections 290-299 of the Executive Law and with the Civil Rights Law, will furnish all information and reports deemed necessary by the State Commissioner of Human Rights under these non-discrimination clauses and such sections of the Executive Law, and will permit access to the Contractor's books, records and accounts by the Owner, the State Commissioner of Human Rights, the Attorney

General and the Industrial Commissioner for the purposes of investigation to ascertain compliance with these nondiscrimination clauses and such sections of the Executive Law and Civil Rights Law.

§ 16.1.6 The Contractor will send to each labor union, or representatives of workers, with which it has, or is bound by a collective bargaining or other Agreement or understanding notices obtained from the State Commissioner of Human Rights, advising such Labor Union or representative of the Contractor's Agreement under requirements of this Article. If the Contractor was directed to do so by Owner as part of the Bid, the Contractor shall request such labor union or representative to furnish him with a written statement that such labor union or representative will not discriminate because of race, creed, color or national origin and that such labor union or representative either will affirmatively cooperate within the limits of its legal and contractual authority in the implementation of the policy and provisions of these non-discrimination clauses or that it consents and agrees that recruitment accordance with the purposes and provisions of these non-discrimination clauses. If such labor union or representative fails or refuses to comply with such a request that it furnish such a statement, the Contractor shall promptly notify the Owner and State Commissioner of Human Rights of such failure or refusal.

§ 16.1.7 The Agreement may be forthwith canceled, terminated or suspended in whole, or in part, by Owner upon the basis of a finding made by the State Division of Human Rights, that the Contractor has not complied with these non-discrimination clauses, and the Contractor may be declared ineligible for future Contracts made by, or in behalf of, the State, or Authority or Agency of the State, or Housing Authority or an Urban Renewal Agency, or Contracts requiring the approval of the Commissioner of Housing and Community Renewal, until it has satisfied the State Division of Human Rights, that it has established and is carrying out a program in conformity with the provisions of these non-discrimination clauses. Such findings shall be made by the State Division of Human Rights after conciliation efforts by the Division have failed to achieve compliance with these non-discrimination clauses and after a verified complaint has been filed with the Division, notice thereof has been given to the Contractor, and an opportunity has been afforded by the Contractor to be heard publicly in accordance with the Executive Law. Such sanctions may be imposed and remedies invoked immediately of, or in addition to sanction in remedies otherwise provided by law. If the Agreement is canceled or terminated under provisions of this Article, in addition to other rights of Owner provided in the Agreement upon its breach by the Contractor, the Contractor will hold Owner harmless against any additional expenses or costs incurred by Owner in completing the work or in purchasing the services, materials, equipment or supplies contemplated by Agreement and Owner may withhold payments from the Contractor in an amount sufficient for this purpose and recourse may be had against authority on the Performance Bond if necessary.

§ 16.1.8 The Contractor will include the provisions of this Article in every subcontract or purchase order in such a manner that such provisions will be binding upon each subcontractor or vendor as to operations to be performed within the State of New York. The Contractor will take such action in enforcing such provisions of such subcontractor or purchase order as the State Division of Human Rights or the Owner may direct, including sanctions or remedies for non-compliance. If the Contractor becomes involved in or is threatened with litigation with a subcontractor or a vendor, as a result of such direction by the State Division of Human Rights, the Contractor shall promptly so notify the Owner and the Attorney General, requesting the Attorney General to intervene and protect the interests of the State of New York.

§ 16.2 Waiver of Immunity

§ 16.2.1 The Contractor hereby agrees to the provisions of Paragraph 139-a and 139-b of the New York State Finance Law and Section 103-a of the New York General Municipal Law, which require that upon the refusal of a person, when called before a grand jury, head of a State department, temporary State commission or other State agency, or the organized crime task force in the Department of Law, which is empowered to compel the attendance of witnesses and examine them under oath, to testify in an investigation concerning any transaction or contract had with the State, any political subdivision thereof, a public authority or with any public department, agency or official of the State or of any political subdivision thereof or of a public authority, to sign a waiver of immunity against subsequent criminal prosecution or to answer any relevant question concerning such transaction or contract.

§ 16.2.1.1 Such person, and any firm, partnership or corporation of which he is a member, partner, director or officer shall be disqualified from thereafter selling to or submitting bids to or receiving awards from or entering into any contracts with New York State or any public department, agency or official thereof for goods, work or services, for a period of five years after such refusal.

(Paragraph deleted)

§ 16.2.1.2 Any and all contracts made with the State of New York, or any public department, agency or official thereof since the effective date of this law, by such person, and by an firm, partnership or corporation of which he is a member, partner, director or officer may be canceled or terminated by the State of New York without incurring any penalty or damages on account of such cancellation or termination, but any moneys owning by the State of New York for goods delivered or work done prior to the cancellation or termination shall be paid.

§ 16.3 Non-Collusive Clause as Required by NYS General Municipal Law Section 103-d

(Paragraph deleted)

§ 16.3.1 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.

(Paragraph deleted)

§ 16.3.2 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 knowledge and belief, the following:

(Paragraph deleted)

- § 16.3.2.1 The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competitions, as to any matter relating to such prices with any other bidder or with any competitor.
- § 16.3.2.2 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.

(Paragraph deleted)

- § 16.3.2.3 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.
- § 16.3.3 A bid shall not be considered for award nor shall any award be made where requirements of this Article have not been complied with; provided however, that in any case the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the bid a signed statement which set forth in detail the reasons therefore. Where requirements of this Article have not been complied with, the bid shall not be considered for award nor shall any award by made unless the head of the purchasing agent of the political subdivision, public department, agency or official thereof to which the bid is made, or his designee, determines that such disclosure was not made for the purpose of restricting competition.

(Paragraph deleted)

- § 16.3.4 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 list for such items, or (c) has sold the same items to other customers at the same prices being bids, does not constitute a disclosure within the meaning of this Article.
- § 16.3.5 Any bid hereafter made to any political subdivision of the state or any public department, agency official thereof by a corporate bidder for work or services performed or to be performed or good sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, and where such bid contains the certification referred to in subdivision one of this section, shall be deemed to have been authorized shall be deemed to include the signing and submission of the bid and the inclusion therein of the certificate as to non-collusion as the act and deed of the corporation.

(Paragraph deleted)

§ 16.4 Assignment of Public Contracts

As provided in Section 109 of the General Municipal Law, the Contractor is prohibited from assigning, transferring, conveying, subletting or otherwise disposing of the same, or of his right title, or interest therein, or his power to execute such contract or any other person or corporation without the previous consent in writing of the officer, board or agency awarding the contract. If any contractor, to whom any contract is let, granted and awarded, as required by law, by any officer, board or agency in a political subdivision, or of any district therein, shall without the previous written consent specified in subdivision one of this section, assign, transfer, convey, sublet or otherwise dispose of such contract, or his right, title or interest therein, or his power to execute such contract, to any other person or corporation, the officer, board or agency which let, made, granted, or awarded such contract shall revoke and annul such contract, and the political subdivision or district therein, as the case may be, and such officer, board or agency shall be relieved and discharged form any and all liability and obligations growing out of such contract to such contractor, and to the person or corporation to which such contract shall have been assigned, transferred, conveyed, sublet or otherwise disposed of, and such contractor, and his assignees, transferees or sublessees shall forfeit and lose all moneys, theretofore earned under such contract, except so much as may be required to pay his employees. The provisions of this section shall not hinder, prevent, or affect an assignment by any such contractor for the benefit of his creditors made pursuant to the laws of this state.

§ 16.5 Fingerprinting

Pursuant to the Safe Schools Against Violence in Education Act ("SAVE" legislation) and Part 87 of the Regulations of the Commissioner of Education, any individual who, as a result of their work on this capital project, will move (or migrate) in and out of student occupied areas for more than five (5) days a year, must be fingerprinted. The Contractor shall be responsible to ensure that it (and its employees) are in full compliance with the fingerprinting provisions New York's SAVE Legislation and Part 87 of the Regulations of the Commissioner of Education at the Contractor's sole cost and expense.

(Paragraph deleted)

ARTICLE 17 NEW YORK STATE LABOR LAW REQUIREMENTS

§ 17.1 Working Hours

(Paragraph deleted)

§ 17.1.1 The Contractor specifically agrees as required by the New York State Labor Law ("Labor Law"), Sections 220 and 220-d, as amended, that:

- No laborer, worker, 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 included in the Contract Documents shall be permitted or required to work more than eight hours in any one calendar day or more than five (5) days in any one week, except to the extent permitted in the case of extraordinary emergencies described in the Labor Law.
- The wages to be paid to each laborer, worker, or mechanic in the employ of the Contractor, Subcontractor, or other person doing or contracting to do all or any part of the work included in the Contract Documents for a legal day's work shall be not less than the prevailing rate of wages as defined by the Labor Law.
- Each laborer, workman or mechanic employed by the Contractor, a Subcontractor, or other person doing or contracting to do all or any part of the work included in the Contract Documents shall be provided the supplements required by Article 8 of the Labor Law.
- The minimum hourly rate of wage to be paid shall be not less than that stated in the General Conditions, and shall be as designated by the industrial Commissioner.
- The Contractor's and any Subcontractor's or other person's filing of payrolls in a manner prescribed by subdivision 3-a of Section 220 of the Labor Law shall be a condition precedent to the to the Owner's payment of any sums due and owing to the Contractor, Subcontractor or other party for work done on or with respect to the Project.

§ 17.2 Wage Rates

(Paragraph deleted)

§ 17.2.1 The Contractor specifically agrees, as required by the Labor Law, that the Contract may be forfeited and no sum paid for any work done thereunder on a second conviction for willfully paying less than:

- the prevailing wage rates as provided in Labor Law Section 220(3) as amended, or, .1
- .2 the minimum wage rates as provided in Labor Law Section 220-d, as amended.

§ 17.2.2 The Contractor 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. Current wage rates for this project are included in the Project Manual as part of the Contract Documents. The Contractor is responsible to regularly review "Prevailing Wage Schedules/Updates" available on the "Prevailing Wage/Public Work" link on State of New York Department of Labor "Business in New York" web page (www.labor.state.ny.gov) to identify and implement any applicable changes to Prevailing Wage Rates during the Project.

(Paragraph deleted)

§ 17.2.3 The Contractor shall comply with all the requirements of the Labor Law Section 220-a, as amended, regarding mandatory submission of certified payroll records, which shall be included with each application for payment.

(Paragraphs deleted)

§ 17.3 Anti-Discrimination

- § 17.3.1 The Contractor specifically agrees, as required by the provisions of Section 220-e of the Labor Law, as amended, that:
 - .1 In the hiring of employees for the performance of work under the Contract or any subcontract hereunder, no contractor, subcontractor, nor any person acting on behalf of such contractor or subcontractor, shall be reason of race, creed, color, sexual orientation, or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates;
 - .2 No contractor, subcontractor, nor any person on its behalf, shall in any manner, discriminate or intimidate any employee hired for the performance of work under the contact on account of race, creed, color, sexual orientation, or national origin.
 - .3 There may be deducted from the amount payable to the Contractor by the Owner under the contract a penalty at 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; and
 - .4 The Contract may be canceled or terminated by the Owner, and all monies due or to become due thereunder may be forfeited for a second or any subsequent violation of the terms or conditions of this section of the Contract.

ARTICLE 18 GENERAL MUNICIPAL LAW REQUIREMENTS OF THE STATE OF NEW YORK

§ 18.1 Payment of Contractors and Subcontractors

§ 18.1.1 The Contractor specifically agrees it is bound by Section 106-b of the New York General Municipal Law.

ARTICLE 19 SPECIFIC CONFORMANCE TO THE LAWS OF THE STATE OF NEW YORK

§ 19.1 Statutory Requirements

§ 19.1.1 The parties agree that each is bound to the provisions of the laws of the State of New York governing bidding and contracting for public improvement projects, including but not limited to applicable provisions of the General Obligations Law, Labor Law, and General Municipal Law. To the extent any provisions in the Contract Documents conflict with any provisions of New York Law, the statutory provisions shall prevail and the conflicting provisions in the Contract Documents shall be deemed to conform to the statutory provisions.

§ 19.1.2 To the extent the laws of the State of New York governing bidding and contracting for public improvement projects mandate inclusion of specific terms in contracts for such improvements, but which are not already included in these General Conditions, such terms shall be deemed and hereby are incorporated into these General Conditions.

(1882732331)

User Notes:

Orange-Ulster BOCES Interior Alterations – Third Floor Regional Education Center at Arden Hill

Section 00 7002

Insurance Rider
(Supplement to Article 11 of Section 00 7000,
AIA A201-2007 For Insurance Requirements for this Project)

Name of Insurance Producer:	
Name of Insured:	

The Contractor shall purchase and maintain during the life of the contract insurances as listed herein. This insurance must be purchased from a New York State licensed, A.M. Best Rated "A" or "A+" carrier. The Owner, the Architect, their Consultants and Subconsultants shall, with the exception of Worker's Compensation and Employer's Liability Insurance, be named as additional named insureds on a primary and non-contributory basis. Contractor must submit additional insured endorsements to the District for approval.

At least ten (10) working days prior to the commencement of the Work, the Contractor and all Subcontractors shall submit to the Owner, through the Architect, a Certificate of Insurance (AIA Form G705) or Accord 25-s showing evidence of insurance coverage as required by these documents. The standard Accord Form of Certificate of Insurance or insurance carrier certificate will be acceptable for employer's liability and statutory Disability. Submit all Workers' Compensation Certificates on form C-105.2, or if funded though the New York State Insurance Fund, on form U-26.3.

All Certificates of Insurance must be signed by a licensed agent or authorized representative of the insurance carrier..

The certificate shall be issued to the Owner with a provision that in the event the policies are either canceled or diminished, at least 30 days prior notice thereof shall be given to the Owner.

The insurance required for this project shall be written for not less than limits of liability specified in this attachment or otherwise within the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from date of commencement of the Work until date of final payment and termination of any coverage required to be maintained after final payment.

.1 General Liability: (Occurrence Form) – Limits Per Project using ISO Form CG 00 01 07 98 or later date

\$2,000,000	General Aggregate
\$2,000,000	Products/Completed Operations
\$1,000,000	Personal and Adv. Injury
\$1,000,000	Occurrence
\$ 100,000	Fire Damage
\$ 10,000	Medical Expense

Coverage to include Broad Form Property Damage, Contractual Liability, Independent Contractors, and Personal Injury. No exclusion for XCU or hazards shall be endorsed to the Policy.

Products and Completed Operations Coverage to be kept in force for 12 months after final payment; a renewal certificate is to be submitted for the project if the coverage renews in less than 12 months following the completion of the project.

Coordinate requirements for additional insurance covering contractual obligations assumed by Contractor as established in Articles 3.18 and 10.3 of these Conditions by using Endorsement ISO Form B, CG2010 11/85 or CG 20 10 10/01 plus CG 20 37 10/01 or equivalent. This endorsement must also reflect that the coverage provided is Primary and Non-Contributory. Waiver of Subrogation applies to all policies for all additional insureds.

.2 Auto Liability to cover ALL autos; or Owned, Hired, Leased and Non-Owned Autos.

\$1,000,000	Combined Single Limit or
\$ 500,000	Bodily injury (per person)
\$1,000,000	Bodily injury (per accident)
\$ 500,000	Property Damage
\$ 5,000	Medical Payments

.3 Excess Liability: Insurance is to cover all stated insurance coverages listed within this Attachment

\$2,000,000	Each Occurrence
\$2,000,000	Aggregate
\$ 10,000	Retention (Maximum)

.4 Workers' Compensation

Statutory	Part A
Statutory	Disability
Employer's Liability	Part B
\$ 500,000	Each Accident
\$1,000,000	Disease Policy Limit
\$ 500,000	Disease Each Employee

.5 Hazardous Material Coverage

Hazardous material liability insurance as	\$2,000,000 occurrence/\$2,000,000 aggregate,
follows:	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 M CS 90.

Coverage shall fulfill all requirements of the Contract and General Conditions and shall extend for a period of three (3) years following acceptance by the Owner of the Certificate of Completion.

.6 Testing Company Errors and Omission Insurance

- county - company - more and - component modulation		
\$1,000,000	Each Occurrence	
\$2,000,000	Aggregate	

22 September 2023 44-90-00-00-8-035-008 Bid Issue Orange-Ulster BOCES
Interior Alterations – Third Floor
Regional Education Center at Arden Hill

for the testing and other professional acts of the Contractor performed under the contract with the Owner.

Further, Contractor shall require all Subcontractors to carry similar insurance coverages and limits of liability as set forth above and adjusted to the nature of Subcontractors' operations and submit same to Owner for approval prior to start of any Work.

Further, it is not the intention of these insurance requirements to require each Subcontractor, vendor or material man involved in the work to provide "excess" coverage in the amounts stated herein but the "excess" limit shall be at least 2 times the contract sum entered into between the individual Contractor and the particular Subcontractor, vendor or material man but not less than \$1,000,000.00, each occurrence, \$3,000,000 aggregate and \$10,000 retention (Maximum).

In the event 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 Owner, Architect, Engineers, Consultants and Subconsultants 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.

The following shall be included as Additional Insureds

- School District (Orange Ulster BOCES), Members of the Board of Education, any officer, member of its staff, employee, or representative of school district.
- KG+D Architects and ALL consultants listed on the cover of the PROJECT/SPECIFICATIONS MANUAL

Proof of Insurance shall show the following Insureds and Holder:			
(a)	Certificate Holder:		
(b)	Additional Named Insureds, on a primary basis:		
	Owner		
	Architect		
	Construction Manager, if applicable		
	Consultants:		



SAMPLE INSURANCE REQUIREMENTS – CAPITAL CONSTRUCTION

- 1. Notwithstanding any terms, conditions or provisions, in any other writing between the parties, the contractor hereby agrees to effectuate the naming of the District/BOCES as an Additional Insured on the contractor's insurance policies, except for workers' compensation and N.Y. State Disability insurance.
- 2. The policy naming the District as an Additional Insured shall:
 - a. Be an insurance policy from an A.M. Best A- rated or better insurer, licensed to conduct business in New York State. A New York licensed and admitted insurer is strongly preferred. The decision to accept non-licensed and non-admitted carriers lies exclusively with the District/BOCES and may create significant vulnerability and costs for the District/BOCES.
 - b. State that the organization's coverage shall be primary and non-contributory coverage for the District/BOCES, its Board, employees and volunteers with a waiver of subrogation in favor of the District/BOCES.
 - c. Additional insured status shall be provided by standard or other endorsements that extend coverage to the District/BOCES for on-going operations (CG 20 38) and products and completed operations (CG 20 37). The decision to accept an endorsement rests solely with the District/BOCES. A completed copy of the endorsements must be attached to the Certificate of Insurance.
- 3. a. The certificate of insurance must describe the services provided by the contractor (e.g., roofing, carpentry or plumbing) that are covered by the liability policies.
 - b. At the District's/BOCES' request, the contractor shall provide a copy of the declaration page of the liability and umbrella/excess policies with a list of endorsements and forms. If requested, the contractor will provide a copy of the policy endorsements and forms.
 - c. There will be no coverage restrictions and/or exclusions involving New York State Labor Law statutes or gravity related injuries.
 - d. A fully completed New York Construction Certificate of Liability Insurance Addendum (ACORD 855 2014/15) must be included with the certificates of insurance. For any "Yes" answers on Items G through L on this Form– additional details must be provided in writing. Policy exclusions may not be accepted.
- 4. The contractor agrees to indemnify the District/BOCES for applicable deductibles and self-insured retentions.



5. Minimum Required Insurance:

a. Commercial General Liability Insurance

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

b. Owners Contractors Protective (OCP) Insurance

For projects less than or equal to \$1,000,000 and work on 1 story (10 feet) only; \$1 million per occurrence, \$2 million aggregate with the District/BOCES as the Named Insured.

For projects greater than \$1,000,000 and/or work over 1 story (10 feet); \$2 million per occurrence, \$4 million aggregate with the District/BOCES as the Named Insured.

For all projects where General Liability, Auto and Umbrella/Excess Coverage is with non-licensed and non-admitted carriers in New York State; \$2 million per occurrence, \$4 million aggregate with the District/BOCES as the named Insured.

The District/BOCES will be the Named Insured on OCP Policies. There will be no Additional Insureds on any OCP Policies.

c. Automobile Liability

\$1,000,000 combined single limit for owned, hired, borrowed and non-owned motor vehicles.

d. Workers' Compensation and NYS Disability Insurance

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



e. **Builder's Risk**

Must be purchased by the contractor to include interest of the Owner and Contractor jointly in a form satisfactory to the owner. The limit must reflect the total completed value – all material and labor costs and provide coverage for fire, lightning, explosion, extended coverage, vandalism, malicious mischief, windstorm, hail and/or flood.

f. Umbrella/Excess Insurance

\$5 million each Occurrence and Aggregate for general construction and no work at elevation (1 story -10 feet) or project values less than or equal to \$1,000,000.

\$10 million each Occurrence and Aggregate for high-risk construction, work at elevation (>1 story or 10 feet) or project values greater than \$1,000,000.

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

- 6. Contractor acknowledges that failure to obtain such insurance on behalf of the District/BOCES constitutes a material breach of contract and subjects it to liability for damages, indemnification and all other legal remedies available to the District/BOCES. The contractor is to provide the District/BOCES with a certificate of insurance, evidencing the above requirements have been met, prior to the commencement of work.
- 7. Subcontractors are subject to the same terms and conditions as stated above and must submit same to the District/BOCES for approval prior to the start of any work.
- 8. In the event the General Contractor fails to obtain the required certificates of insurance from the Subcontractor and a claim is made or suffered, the Contractor shall indemnify, defend, and hold harmless the District/BOCES, its Board, employees and volunteers from any and all claims for which the required insurance would have provided coverage. This indemnity obligation is in addition to any other indemnity obligation provided in the Contract.



ADDITIONAL REQUIREMENTS ASBESTOS, LEAD ABATEMENT AND/OR HAZARDOUS MATERIALS

Asbestos/Lead Abatement/Pollution Liability Insurance

\$2,000,000 per occurrence/\$2,000,000 aggregate, including products and completed operations. Such insurance shall include coverage for the Contractor's operations including, but not limited to, removal, replacement, enclosure, encapsulation and/or disposal of asbestos, or any other hazardous material, along with any related pollution events, including coverage for third-party liability claims for bodily injury, property damage and clean-up costs. If a retroactive date is used, it shall pre-date the inception of the Contract.

If the Contractor is using motor vehicles for transporting hazardous materials, the Contractor shall maintain pollution liability broadened coverage (ISO Endorsement CA 9948), as well as proof of MCS 90. Coverage shall fulfill all requirements of these specifications and shall extend for a period of three (3) years following acceptance by the District/BOCES of the Certificate of Completion.

Testing Company Errors and Omission Insurance

\$1,000,000 per occurrence/\$2,000,000 aggregate for the testing and other professional acts of the Contractor performed under the Contract with the District/BOCES.

PROJECT LABOR AGREEMENT

1.1 REQUIREMENT FOR PROJECT LABOR AGREEMENT

- A. As a condition of being awarded a contract for work covered by the Bid Documents, the successful Bidder agrees to enter into, become signatory to, and to abide by, the provisions of the Project Labor Agreement negotiated on behalf of the Owner by the Palombo Group with the Hudson Valley Building and Construction Trades Council, AFLCIO and the signatory local unions. A copy of this Project Labor Agreement ("PLA") is attached to this Section 007013.
- B. The successful Bidder shall require any and all of its subcontractors of any tier on the ORANGE ULSTER BOCES CAPITAL IMPROVEMENT PROJECTS to become signatory to, and to abide by, the PLA.

1.2 APPRENTICE TRAINING PROGRAMS

- A. As required by Section 222 of the New York Labor Law, the Owner will require each contractor and subcontractor performing work on the Project to participate in apprentice training programs in the trades of work it employs.
- B. Each such apprentice training program must have at least one apprentice currently enrolled in the program and must have been approved by the New York State Department of Labor for not less than three (3) years.

1.3 DESIGN AND CONSTRUCTION

A. As required by Section 222 of the New York Labor Law, the design of the Project shall be subject to the review and approval of the Owner and the design and construction standards of the Project shall be subject to the review and approval of the Owner.

1.4 APPLICABLE PLA

A. A copy of the PLA is attached to this Section 007013

PROJECT LABOR AGREEMENT

COVERING CONSTRUCTION OF

ORANGE-ULSTER BOCES

CAPITAL IMPROVEMENT

PROJECTS

September 8, 2023

ORANGE - ULSTER BOCES CAPITAL IMPROVEMENT PROJECTS PROJECT LABOR AGREEMENT

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PROJECT LABOR AGREEMENT

PREAMBLE

WHEREAS, ORANGE - ULSTER BOCES desires to provide for the cost efficient, safe, quality, and timely completion of the ORANGE - ULSTER BOCES CAPITAL IMPROVEMENT PROJECTS in a manner designed to afford the lowest reasonable costs to the BOCES and component districts, and the committee they represent, and the advancement of permissible statutory objectives;

WHEREAS, ORANGE - ULSTER BOCES engaged Hill International ("Hill") to undertake a study of which a copy is on file with ORANGE - ULSTER BOCES of whether the use of a Project Labor Agreement will best serve ORANGE - ULSTER BOCES interest in obtaining the best work at the lowest possible price, preventing favoritism, fraud and corruption, and other considerations such as the impact of delay, the possibility of cost saving advantages, and any local history of labor unrest; and

WHEREAS, the Hill Due Diligence Assessment of the Impacts and Implementation of a Project Labor Agreement, (the "Study"), concluded that use of a Project Labor Agreement would provide ORANGE - ULSTER BOCES with measurable economic benefits and would promote ORANGE - ULSTER BOCES interest in obtaining the best work at the lowest prices as well as preventing favoritism, fraud and corruption; and

WHEREAS, ORANGE - ULSTER BOCES has carefully reviewed and considered the Study and determined, among other things, that ORANGE - ULSTER BOCES interest in obtaining the best work at the lowest possible price, preventing favoritism, fraud and corruption, preventing the impact of delay owing to labor unrest, obtaining cost savings advantages, and gaining measurable management flexibility and benefits are best met by requiring a Project Labor Agreement and, therefore, directs that a Project Labor Agreement be made part of the Project; and

WHEREAS, this Project Labor Agreement will foster the achievement of these goals, inter alia, by:

- (1) expediting the construction process and otherwise minimizing the disruption to the project;
- (2) avoiding the costly delays of potential strikes, slowdowns, and walkouts arising from work disputes and promoting labor harmony and peace for the duration of the project;
- (3) standardizing the terms and conditions governing the employment of labor on the project;
- (4) permitting flexibility in work scheduling where necessary at affordable pay rates;
- (5) permitting adjustments to work rules and staffing requirements from those which otherwise might apply;
- (6) providing comprehensive and standardized mechanisms for the settlement of work disputes, including those relating to jurisdiction;

- (7) promoting work opportunities for those within ORANGE ULSTER COUNTIES and surrounding areas.
- (8) ensuring a reliable source of skilled and experienced labor;
- (9) promoting and creating work opportunities on this project for former and future ORANGE ULSTER BOCES graduates.

WHEREAS, ORANGE - ULSTER BOCES, has, through independent investigation and analysis, determined the likelihood of substantial cost savings to the Project will result from the application of this Agreement; and

WHEREAS, the Hudson Valley Building & Construction Trades Council, and its affiliated Local Unions and their members, desire to provide for stability, security and work opportunities which are afforded by a Project Labor Agreement; and others; and

WHEREAS, the Parties desire to maximize project safety conditions for both workers and others;

NOW, THEREFORE, the Parties enter into this Agreement:

I. ARTICLE 1 - PARTIES TO THE AGREEMENT

SECTION 1.1 PARTIES TO THE AGREEMENT

This is a Project Labor Agreement ("Agreement") entered into for all Project construction, as defined herein, as part of the ORANGE - ULSTER BOCES CAPITAL IMPROVEMENT PROJECTS (as defined below) between (1) ORANGE - ULSTER BOCES (2) the Palumbo Group as Construction Managers (3) Hudson Valley Building and Construction Trades Council ("Council") on behalf of itself and its affiliated Local Unions ("Local Unions"); and the signatory Local Unions on behalf of themselves and their members.

II. ARTICLE 2 - GENERAL CONDITIONS SECTION

SECTION 2.1 DEFINITIONS

Throughout this Agreement:

- (A) "Contractor(s)" means any contractor and subcontractors of whatever tier engaged in Project Work within the scope of this Agreement as defined in Article 3, subject to exclusions defined in Section 3.3; 20.3 and 20.4.
- (B) "Council" means the Hudson Valley Building & Construction Trades Council, AFL-CIO.
- (C) "Local Union(s)" means the Local Unions signatory to this Agreement, individually

and collectively.

- (D)"Owner" means ORANGE ULSTER BOCES.
- (E) "Owner's Representative" means any Construction Manager or other individual or entity designated by the Owner to enter into this Agreement or otherwise act on its behalf.
- (F) "The Project" means the work to be performed in connection with all construction associated with the ORANGE ULSTER BOCES CAPITAL IMPROVEMENT PROJECTS as more fully set forth in Article 3, Section 3.1, subject to exclusions defined in Sections 3.3, 20.3 and 20.4.
- (G)"Project Work" means the work covered by this Agreement and fully defined in Article 3, Section 3.1, subject to exclusions defined in Section 3.3; 20.3 and 20.4.
- (H)"Schedule A" means and refers to collective bargaining agreements of affiliated Local Unions.
- (I) "Union Parties" and "Unions" means the Hudson Valley Building & Construction Trades Council, AFL-CIO and the signatory Local Unions to this Agreement, individually and collectively.

SECTION 2.2 CONDITIONS FOR AGREEMENT TO BECOME EFFECTIVE

This Agreement shall not become effective unless each of the following conditions are met: (1) the Agreement is signed by the Council and the Local Unions having jurisdiction over the Project Work; (2) the Agreement is approved by the NYS Building & Construction Trades Council (NYSBCTC); (3) the Agreement is approved by the NABTU; (4) the Agreement is authorized by the Owner and signed by the Owner or the Construction Manager (CM).

SECTION 2.3 ENTITIES BOUND & ADMINISTRATION OF AGREEMENT

This Agreement shall be binding on all signatory Unions and their affiliates and all Contractors performing Project Work as defined in Article 3, subject to exceptions in Sections 3.3, 20.3 and 20.4. The Contractors shall include in any subcontract that they let for performance during the term of this Agreement a requirement that their Subcontractors, of whatever tier, become bound by this Agreement with respect to that subcontracted Project Work performed within the scope of Article 3, and require that each Subcontractor, of whatever tier, sign a Letter of Assent (Schedule B). This Agreement shall be administered by the Designee named by the Owner pursuant to Schedule C.

SECTION 2.4 SUPREMACY CLAUSE

This Agreement, together with the local Collective Bargaining Agreements appended hereto and referred to herein as "Schedule A" represents the complete understanding with respect to the Project and supersedes any national agreement, local agreement, or other collective bargaining agreement of any type which would otherwise apply to Project Work, in whole or in part except that, to the NTL Articles of Agreement, the National Stack/Chimney Agreement, the National Cooling Tower Agreement, the UA/IBEW Joint National Agreement for Instrument and Control Systems Technicians, and the National Agreement of the International Union of Elevator

Constructors (the "National Agreements"), those National Agreements shall apply, except that when Contractor is also a signatory to an agreement listed in Schedule A hereof, Articles 7, 9, and 10 of this Agreement shall prevail over the applicable National Agreement and any Schedule A agreement. Where a subject covered by the provisions of this Agreement is also covered by a Schedule A agreement, the provisions of this Agreement shall prevail. If this Agreement is silent on any matter addressed in the applicable Schedule A agreement, the Schedule A agreement shall govern. It is understood that by virtue of having become bound by this Project Labor Agreement, the Contractors will not be obligated to sign any other local, area, or national agreement.

SECTION 2.5 LIABILITY

The liability of any Contractor and the liability of any Union under this Agreement shall be several and not joint. The Contractors, and Subcontractors shall not be liable for any violations of this Agreement by any other Contractor or Subcontractor; and the Council and Local Unions shall not be liable for any violations of this Agreement by any other Union. Notwithstanding the above, every signatory to the Agreement further acknowledges that it will be liable for its own breach, partial breach or otherwise, whether related or not to the breach of another signatory.

SECTION 2.6 THE BID SPECIFICATIONS

The Owner shall require in its bid specifications for all Project Work within the scope of Article 3 that all successful bidders and their Subcontractors of whatever tier (unless otherwise excepted under this Agreement) become bound by this Agreement. Every Contractor shall require its Subcontractors, of whatever tier, to execute the Letter of Assent in Schedule B and to become bound by this Agreement.

SECTION 2.7 AVAILABILITY AND APPLICABILITY TO ALL SUCCESSFUL BIDDERS

This Agreement shall be binding on all signatory Unions and their affiliates, and all Contractors, Unions and/or non-Unions performing Project Work, unless otherwise excepted under this Agreement. Unless expressly provided for in this Agreement, this Agreement shall not apply to the work of any Contractor which is performed at any location other than the site of ProjectWork.

III. ARTICLE 3 - SCOPE OF THE AGREEMENT

SECTION 3.1 PROJECT WORK

This Agreement shall only apply to Project Work as defined in this Article.

Subject to the exclusions in this Article, Project Work means solely that work performed in connection with all construction associated with the ORANGE - ULSTER BOCES CAPITAL IMPROVEMENT PROJECTS in various locations listed below. Project Work, unless otherwise excepted under Sections 3.3, 20.3 or 20.4, shall include all sitework, utilities, demolition, environmental work, MEP's and all construction related to the ORANGE - ULSTER BOCES CAPITAL IMPROVEMENT PROJECTS, but not limited to the following:

Arden Hill Campus – Regional Education Center (Main Building) – Interior Alterations to Third Floor

This project is a renovation of the currently unoccupied third floor of the OUB Regional Education Center (Main Building) at Arden Hill for BOCES educational and administrative programs. Renovations include framing, finishes, doors, and related accessories for creation of new classrooms spaces and support spaces in the area of renovation. Fully renovated mechanical, electrical and plumbing systems will be installed throughout renovated areas.

Arden Hill Campus – Regional Education Center (Main Building) – Additions & Alterations to North Wing

This project is a renovation to the existing North Wing of the OUB Regional Education Center (Main Building) at Arden Hill. This two-story portion of the building is currently unoccupied. Renovations and infrastructure upgrades will include renovation of both stories of the North Wing for use by BOCES educational and administrative programs. Renovations include framing, finishes, doors, and related accessories for creation of new classroom spaces and support spaces. Exterior renovations include masonry repointing, roof replacement and replacement of all exterior doors and windows. Fully renovated HVAC, electrical and plumbing systems will be installed throughout the renovated areas. A new exterior "Learning Stair" addition will be constructed that will be utilized for outdoor education purposes. Site improvements at the exterior of the building include renovations to the plaza area and new sidewalks for ADA accessibility.

Arden Hill Campus - Site Preparation and Demolition of Buildings 2 and 3

At the OUBOCES Arden Hill Campus, this project involves demolition of Building 2 and Building 3 with associated sitework preparations, in advance of a future proposed Gymnasium Addition to the Arden Hill Regional Education Center Main Building. The future Additions and Alterations Project will involve a New Gymnasium Addition and Site Improvements including grass play fields, hardscape play areas, parking areas, driveways and walkways. See related project "Arden Hill Campus Regional Education Center (Main Building) – Additions and Alterations.

Arden Hill Campus – Regional Education Center (Main Building) – Additions & Alterations

This project involves a new Gymnasium Addition (Gymnasium, Multi-Purpose Room, Support Spaces) to the Existing Regional Education Center (Main Building). Additional work includes full roof replacement and window replacement to the Main Building. Site Improvements include grass and hardscape play areas, parking areas, driveways, walkways, landscaping, and utilities.

Arden Hill Campus – Additions and Alterations to Building 1

This project involves additions and alterations to existing unoccupied Building 1 at the Arden Hill Campus. Renovation work includes a full gut renovation of the building including framing, finishes, doors, and related accessories for creation of new administrative office spaces and support spaces. Exterior renovations include masonry repointing, siding replacement, roof replacement and replacement of all exterior doors and windows. Fully renovated HVAC, electrical and plumbing systems will be installed throughout the renovated areas. A new small Main Entrance addition will be constructed to house an ADA lift for access to both floor levels. Site improvements at the exterior

of the building include new sidewalks, parking, landscaping and utilities.

Gibson Road Campus - Additions and Alterations to Axelrod

This project is an addition and renovation to the existing Axelrod Special Education School Building located at the Gibson Road Campus. Renovation work includes renovations to classroom spaces, toilet rooms, corridors, stairways, Auditorium and Cafeteria. Additional work includes full roof replacement and exterior door and window replacement throughout. Upgrades to HVAC, electrical and plumbing systems will be provided throughout the interior renovated areas. A new Main Entrance Addition will be constructed with a Lobby, Security Vestibule, Main Office suite and exterior canopy. Site improvements include renovations to the front plaza, sidewalks and paving.

Gibson Road Campus – Additions and Alterations to Career and Tech Building (CTEC)

This project involves additions and renovations to the existing Career and Technical Institute Building (CTEC) at the Gibson Road Campus. Renovation work includes renovations to general classroom spaces and other specialty classrooms spaces (shops, labs, etc.). Renvoations will also occur at the ktichesn, toilet rooms, corridors, and stairways. Additional work includes full roof replacement and exterior door and window replacement throughout. Upgrades to HVAC, electrical and plumbing systems will be provided throughout the interior renovated areas. The existing 400 Building will be demolished. A new security vestibule addition will be provided at the Main Entrance. Two additional building additions will create additional classroom spaces and a multipurpose room. Site improvements include sidewalks, driveways, landscaping, utilities, and other paving.

SECTION 3.2 TIME LIMITATIONS

- A. To be covered by this Agreement, Project Work must be awarded after the effective date of this Agreement.
- B. This Agreement shall expire upon completion and acceptance by the Owner of the Project.
- C. This Agreement may be extended by written mutual agreement of the parties.

SECTION 3.3 EXCLUDED EMPLOYEES

Notwithstanding the provisions of Section 3.1 of this Article, the following person/entities are not subject to the provisions of this Agreement even though performing work on or in connection with the Project:

A. Superintendents, supervisors (excluding general and forepersons specifically covered by a craft's Schedule A), engineers, inspectors and testers, quality control/assurance personnel, timekeepers, mail carriers, clerks, office workers, messengers, guards

employed by Owner, technicians, non-manual employees, and all professional, engineering (except field surveyors), administrative and management persons;

- B. Employees of the Project Owner;
- C. Employees and entities engaged in off-site manufacture, modifications, repairs, maintenance, or painting, handling or fabrication of project components, materials, equipment, or machinery except for any local deliveries of materials such as fill, construction debris removal, ready mix, asphalt, concrete and other aggregates which shall be covered under this Agreement.
- D. Employees of the Construction Manager, except that performing manual, onsite construction labor who will be covered by this Agreement.
- E. Employees engaged in onsite equipment warranty work;
- F. Employees engaged in geophysical testing (whether land or water) other than boring for core samples;
- G. Employees engaged in laboratory or specialty testing or inspections, unless ordinarily done by a member of a Trade Union;
- H. Employees engaged in ancillary Project Work performed by third parties such as electric utilities, gas utilities, telephone companies, and railroads. Utility work provided by gas, electric, and cable companies, which is not performed by utility company employees, shall be subject to the terms of this Agreement.

IV. ARTICLE 4 - UNION RECOGNITION AND EMPLOYMENT

SECTION 4.1 PRE-HIRE RECOGNITION

The Contractors recognize the signatory Unions as the sole and exclusive bargaining representatives of all craft employees who are performing Project Work within the scope of Article 3 of this Agreement.

SECTION 4.2 UNION REFERRAL

A. The Contractors agree to hire craft employees for Project Work covered by this Agreement through the job referral systems and hiring halls established in the Local Unions' area collective bargaining agreements (attached as Schedule A to this Agreement), where those referrals meet the qualifications set forth in items 1, 2, and 4 of subparagraph B. The Unions agree to provide such craft employees (including apprentices) to all Contractors on a non-discriminatory basis.

Notwithstanding this, Contractors shall have sole right to determine the competency of all referrals; the number of employees required; and the selection of employees for layoff (subject to Article 5, Section 5.3). In the event that a Local Union is unable to fill any request for qualified employees within a 48-hour period after such requisition is made by a Contractor (Saturdays, Sundays and holidays excepted), a Contractor may employ qualified applicants from any other available source. In the event that the Local Union does not have a job referral system, the Contractor shall give the Local Union first preference to refer applicants, subject to the other provisions of this Article. The Contractor shall notify the Local Union of craft employees hired for Project Work within its jurisdiction from any source other than referral by the Union. The Local Unions will cooperate with Contractor requests for minority, women, or economically disadvantaged referrals to meet the goals of Article 4, Section 4.4. These workers may be delivered under a "Direct Entry" designation or by use of a Department of Labor waiver.

- B. A Contractor may request by name, and the Local Union will honor, referral of persons who have applied to the Local Union for Project Work and who meet the following qualifications:
 - (1) Possess any license required by New York State law for the Project Work to be performed;
 - (2) Have worked a total of at least 1000 hours in the construction craft during the prior two years, and
 - (3) Were on the Contractor's active payroll for at least 60 out of the 180 calendar days prior to the contract award.
 - (4) Have the ability to safely perform the basic functions of the applicable trade.
 - (5) Have not committed a felony or misdemeanor, or other violation that would render such person unfit to work on County property.
- C. No more than twelve and a half (12.5%) per centum of the employees covered by this Agreement, per Contractor by craft, shall be hired through the provisions of Paragraph B of this section (any fraction shall be rounded to the next highest whole number). Craft forepersons and/or general forepersons shall be included in these twelve and a half (12.5%) percent. If requested by the appropriate Union, a Contractor utilizing this provision for by- name referrals shall furnish the Union with a written certification that the individuals requested for referral meet the requirements of (1) (5) above.
- D. The Local Unions shall exert their utmost efforts to recruit sufficient numbers of skilled craft workers to fulfill the manpower requirements of the Contractor. When a Contractor of any tier is contracted to perform Project Work and such Contractor

is not signatory to a Schedule A agreement (not including signatory through this Agreement) and the Union cannot provide ample labor to support the construction schedule or project, then the Contractor shall hire outside the Union hiring halls and the Contractor shall, at their discretion, replace the non-Union or non-dispatched employee when notified by the Union that labor has become available through the Union. The Contractor shall use other employees affiliated with the Council before hiring except, where specifically addressed in this Agreement if those employees from the other Unions have the required trade skills to perform the Project Work. Those hired through this provision shall be laid off before those of an affiliated Union.

E. Notwithstanding the foregoing, ORANGE - ULSTER BOCES or a representative of, shall have the sole discretion to request that a person be removed from working on this Project.

SECTION 4.3 NON-DISCRIMINATION IN REFERRALS

A. The Local Unions represent that their hiring halls and referral systems shall be operated in a non-discriminatory manner and in full compliance with all applicable federal, state and local laws and regulations which require equal employment opportunities. Referrals shall not be affected in any way by the rules, regulations, bylaws, constitutional provisions or any other aspects or obligations of Union membership, policies, or requirements and shall be subject to such other conditions as are established in this Article. No employment applicant shall be discriminated against by any referral system or hiring hall because of the applicant's Union membership, or lack thereof.

SECTION 4.4 WORKFORCE DIVERSITY UTILIZATION

The Unions recognize and acknowledge that workforce diversity of minorities and women are employment goals consistent with our values of fair play. The Local Unions agree and will strive to utilize their best efforts to provide qualified minority and female applicants.

SECTION 4.5 CROSS AND QUALIFIED REFERRALS

The Local Unions shall not knowingly refer to a Contractor an employee then employed by another Contractor working under this Agreement. The Local Unions shall exert their utmost efforts to recruit sufficient numbers of skilled and qualified crafts employees to fulfill the requirements of each Contractor.

SECTION 4.6 UNION DUES

Nothing in this Agreement requires employees to join a Union or pay dues or fees to a Union as a condition of working on the Project. This Agreement is not, however, intended to supersede independent requirements in applicable Local Union Agreements as to Contractors

that are otherwise signatory to those Agreements in relation to employees of such Contractors performing Project Work.

V. ARTICLE 5 - UNION REPRESENTATION

SECTION 5.1 LOCAL UNION REPRESENTATIVE

Each Local Union signatory to this Agreement shall be entitled to designate a representative and/or Business Manager who shall be afforded access to the Project site only during times when Project Work is being conducted.

SECTION 5.2 STEWARDS

- A. Each Local Union shall have the right to designate from among those referred to the Project a working journey person as a Steward or Lead Engineer and one alternate per shift, and shall notify the Construction Manager of the identity of the designated Steward or Lead Engineer (and alternate) prior to the assumption of such duties. Stewards or Lead Engineer shall not exercise supervisory functions and shall receive the rate of pay for their craft classifications. There will be no non-working Stewards or Lead Engineer on the Project.
- B. In addition to his/her work as an employee, the Steward or Lead Engineer shall have the right to receive complaints or grievances and to discuss and assist in their adjustment with the Contractor's appropriate supervisor; such activities, however, are not to interfere with the Steward's work unless an emergency situation exists. Each Steward or Lead Engineer shall be concerned with the employees of the Steward's Contractor and, if applicable, Subcontractors of that Contractor, but not with the employees of any other Contractor. The Contractor will not discriminate against the Steward or Lead Engineer in the proper performance of Union duties.
- C. Requirements for stewards or lead engineer shall be as per the applicable Schedule A agreement.
- D. Where multiple projects or more than one general contractor is performing work at the same time, the construction manager may employ the laborer steward or another craft steward.

SECTION 5.3 LAYOFF OF A STEWARD

Contractors agree to notify the appropriate Union 24 hours prior to the layoff of a Steward or Lead Engineer, except in cases of discipline or discharge for just cause. If a Steward is protected against layoff by a Schedule A agreement, such provisions shall be recognized to the extent the Steward or Lead Engineer possesses the necessary qualifications to perform the Project Work required. In any case in which a Steward or Lead Engineer is discharged or disciplined for

just cause, the Local Union involved shall be notified immediately by the Contractor.

SECTION 5.4 UNION STANDARDS

- A. The Council and its affiliates have a legitimate interest in preventing the undermining of the work opportunities and standards gained through collective bargaining and desire to preserve and protect work opportunities for its members.
- B. ORANGE ULSTER BOCES, while recognizing this interest, must maintain its ability to utilize the services of off-site fabricators and those entities involved in deliveries of construction materials, except those materials included m Section 3.3, when not covered under New York State Labor Law 220.
- C. While the scope of the Agreement is limited to Project Work as defined and subject to exceptions herein, Contractors should, whenever economically feasible, make reasonable efforts to use Union signatory vendors, which includes, but not limited to, UA Yellow Label and SMW Blue Label products for off-site assemblies or fabrications.
- D. This Section does not refer to construction material normally purchased preassembled or manufactured, it references Project Work normally and historically done on-site or in Local Union fabrications shops.
- E. If any dispute should arise with respect to this Section, the Contractors agree to install any off-site assemblies or fabricated items regardless of the source. The parties shall endeavor to settle such dispute in the Labor Management forum or appropriate sub-committee before a grievance is filed under Article 9.

VI. ARTICLE 6 - MANAGEMENT RIGHTS

SECTION 6.1 RESERVATION OF RIGHTS

Except as expressly limited by a specific provision of this Agreement, Contractors retain full and exclusive authority for the management of their operations including, but not limited to: the right to direct the Project Work force, including determination as to the number to be hired and the qualifications therefore; the promotion, transfer, layoff of its employees; or the discipline or discharge for just cause of its employees; the assignment and schedule of Project Work; the promulgation of reasonable Project Work rules; and the requirement, timing and number of employees to be utilized for overtime Project Work. Nothing contained herein shall be construed so as to allow direction of an Employee to perform Project Work outside the jurisdiction of that Employee's Labor Union affiliation, if any. No rules, customs, or practices which limit or restrict productivity or efficiency of the individual (as determined by the Contractor) and/or joint working efforts with other employees shall be permitted or observed.

SECTION 6.2 MATERIALS, METHODS & EQUIPMENT

A. There shall be no limitation or restriction upon the Owner's choice of materials, techniques, methods, technology or design, or, regardless of source or location, upon the use and installation of equipment, machinery, package units, pre-cast, pre-fabricated, pre-finished, or pre-assembled materials, tools, or other labor-saving devices. Contractors may, without restriction, install or use materials, supplies or equipment regardless of their source. The on-site installation or application of such items shall be performed by the craft having jurisdiction over such Project Work pursuant to an applicable collective bargaining agreement; provided, however, it is recognized that other personnel having special qualifications may participate, in a supervisory capacity, in the installation, check-off or testing of specialized or unusual equipment or facilities as designated by the Contractor.

VII. ARTICLE 7 - WORK STOPPAGES AND LOCKOUTS SECTION

SECTION 7.1 NO STRIKES-NO LOCK OUT

There shall be no strikes, sympathy strikes, picketing, work stoppages, slowdowns, demonstrations, or other disruptive activity on Project Work site for any reason by any signatory to this Agreement. There shall be no Union or concerted or employee activity which disrupts or interferes with the Project Work. Should any employee breach this provision, the Local Unions will use their best efforts to immediately end the breach and return all employees to work. There shall be no lockout by any signatory to this Agreement.

SECTION 7.2 DISCHARGE FOR VIOLATION

A Contractor may discharge any employee violating Section 7.1, above, and any such employee will not be eligible thereafter for referral under this Agreement for a period of 100 working days.

SECTION 7.3 NOTIFICATION

If a Contractor contends that any Union has violated this Article, it shall notify the Council of such fact, with copies of the notification to the Local Union involved. The Council and Local Union shall instruct, order, and otherwise use their best efforts to cause the employee(s) to immediately cease and desist from any violation of this Article. The Council shall not be liable for the unauthorized acts of a Local Union or its members. Similarly, a Local Union and its members shall not be liable for any unauthorized acts of its members, the Council, or another Local Union.

SECTION 7.4 EXPEDITED ARBITRATION

Any Contractor or Union alleging a violation of Section 7.1 of this Article or Section 8.3(D)(2) of Article 8 may utilize the expedited procedure set forth below (in lieu of, or in addition to, any actions at law or equity) that may be brought.

- A. A party invoking this procedure shall notify J. Pierson, Neal M. Eiseman and Thomas Hines, who shall alternate as Arbitrator under this expedited arbitration procedure. If the Arbitrator next on the list is not available to hear the matter within 24 hours of notice, the next Arbitrator on the list shall be called. Copies of such notification will be simultaneously sent to all parties (the alleged violator, the Council, the Local Union, the Contractor, and the Owner).
- B. The Arbitrator shall hold a hearing within 48 hours of receiving the notice invoking the procedure if it is contended that the violation still exists. The Arbitrator shall provide at least 24 hours' notice (excluding Sundays and holidays) to all parties as to time and place of the hearing.
- C. All notices pursuant to this Article must be delivered to all parties (Local Union, Council, Contractor, alleged violator, and Owner) and may be provided by telephone, telegraph, hand delivery, fax, email, or confirmed overnight delivery. The hearing may be held on any day including Saturdays or Sundays. The hearing shall be completed in one session which shall not exceed 8 hours duration (no more than 4 hours being allowed to either side to present their case and conduct their cross examination) unless otherwise agreed. A failure of any party to attend the hearing shall not delay the hearing of evidence by those present or the issuance of an award by the Arbitrator.

D. (i) Section 7.1 hearings:

The sole issue at the hearing shall be whether a violation of Section 7.1 occurred. If a violation is found to have occurred, the Arbitrator shall issue a Cease-and-Desist Award restraining such violation and serve copies on all parties. The Arbitrator shall have no authority to consider any matter in justification, explanation or mitigation of such violation or to award damages (any damages issue is reserved solely for court proceedings, if any). The Award shall be issued in writing within 3 hours after the close of the hearing, and may be issued without an Opinion. If any involved party desires an Opinion, one shall be issued within 15 calendar days, but its issuance shall not delay compliance with, or enforcement of, the Award.

(ii) Section 8.3(D)(2) hearings:

The sole issue at the hearing shall be whether a violation of Section 8.3(D)(ii) occurred. If a violation is found to have occurred, it shall be prima facie evidence of intentional mis-assignment, and the Arbitrator shall issue an immediate stopwork order with respect to the Project Work involved and reassign the Project Work

as necessary. The Arbitrator is also authorized to (a) award damages or back pay in order to make the aggrieved trade whole, and (b) remove the offending Contractor from the job in egregious situations.

- E. An Award issued under this procedure may be enforced by any court of competent jurisdiction upon the filing of this Agreement together with the Award. Notice of the filing of such enforcement proceedings shall be given to all parties. In any court proceeding to obtain a temporary or preliminary order enforcing the Arbitrator's Award as issued under this expedited procedure, the involved Union and Contractor waive their right to a hearing and agree that such proceeding may be commenced by order to show cause. Such agreement does not waive any party's right to participate in a hearing for a final court order of enforcement or in any contempt proceeding.
- F. Any rights created by statute or law governing arbitration proceedings which are inconsistent with the procedure set forth in this Article, or which interfere with compliance thereto, are hereby waived by the Contractors and Unions to whom they accrue.
- G. The fees and expenses of the Arbitrator shall be equally divided between the involved Contractor and Union.

SECTION 7.5 ARBITRATION OF DISCHARGES FOR VIOLATION

Procedures contained in Article 9 shall not be applicable to any alleged violation of this Article, with the single exception that an employee discharged for violation of Section 7.1, above, may have recourse to the procedures of Article 9 to determine only if the employee did, in fact, violate the provisions of Section 7.1 of this Article; but not for the purpose of modifying the discipline imposed where a violation is found to have occurred.

VIII. ARTICLE 8 - LABOR MANAGEMENT COMMITTEE

SECTION 8.1 SUBJECTS

The Project Labor Management Committee ("Committee") will meet as established by the Committee to: 1) promote harmonious relations among the Contractors and Unions; 2) enhance safety awareness, cost effectiveness and productivity of construction operations; 3) protect the public interest; 4) discuss matters relating to staffing and scheduling with safety and productivity as considerations; 5) review Affirmative Action and equal employment opportunity matters pertaining to the Project, if any and increase work opportunity within the County for County residents, and former or future ORANGE - ULSTER BOCES graduates.

SECTION 8.2 COMPOSITION

The Committee shall be jointly chaired by a designee of the Owner and the Council. It may include representatives of the Local Unions and Contractors involved in the issues being discussed. The Committee may conduct business through mutually agreed upon sub-committees.

SECTION 8.3 PRE-JOB CONFERENCE

- A. So that the start and continuation of Project Work may progress without interruption, the Committee shall require each Contractor and Subcontractor of whatever tier to conduct a pre-job conference with the Council prior to commencing work. The Construction Manager or General Contractor shall be advised in advance of such conferences and may participate if they wish. This pre-job conference with the Council is in addition to any pre-job/pre-construction conferences required by the Project Contract Documents.
- B. The purpose of the pre-job conference with the Council shall be for the parties to gain an understanding of each Contractor's proposed work assignments, the standard work day and work week, the number of employees to be employed, the method of referral, the applicable wage rates and fringe benefit contributions and any other matters in accordance with this Agreement.
- C. Proposed Trade Assignments. In conjunction with the pre-job conference with the Council required by this Section, each Contractor shall fill out the attached Schedule E- Proposed Trade Assignments identifying all Subcontractors and indicating what trades will be used to perform the Project Work. This form shall be submitted to the Council at least fourteen (14) days in advance of the commencement of Project Work. If any Local Union(s) objects to or disagrees with the Proposed Trade Assignment of either the Contractor or Subcontractor, the Local Union will state its objection within three (3) days of the submission of the Proposed Trade Assignments and there shall be a good faith discussion among the Contractor or Subcontractor and the objecting Local Union and other affected Unions to resolve the matter. If no resolution is reached, any involved Local Union may submit their objection position in writing, together with support documentation, within seven (7) calendar days of the submission of the Proposed Trade Assignments to the Contractor or Subcontractor with a copy to all affected Local Unions. Failure of any objecting Local Union and/or other affected Unions to timely object or submit such objection positions in writing waives any objection to the Proposed Trade Assignments. The Contractor or Subcontractor will review all submitted supporting documentation regarding the Proposed Trade Assignments and will submit to the Construction Manager, the Council, and all affected Local Unions a "Final Trade Assignment" letter within fourteen (14) days calendar days of the pre-job meeting at which the Proposed Trade Assignments were made.
- D. Disputes and Violations.

- (1) Unresolved disputes concerning trade assignments shall be handled in accordance with Section 10.1, 10.2, and 10.3 of Article 10 in accordance with the National Plan for Settlement of Jurisdictional Dispute in the Construction Industry established by the Building and Construction Trades Department, incorporated by reference in Schedule D, provided however, that disputes concerning intra-trade assignments (assignments between trades within the same International Union) will be determined by the applicable International Union.
- (2) Contractor's failure to conduct a pre-job conference with the Council, failure to include all required parties in a pre-job conference with the Council, or failure to adhere to agreed-upon Schedule E trade assignments is a violation of this Agreement and prima facie evidence of intentional mis- assignment. Alleged violations of this provision shall be considered a lock- out and subject to the expedited arbitration procedures of Article 7, Section 7.4.
- (3) All remaining unresolved issues shall be subject to the provisions of Article 9.

IX. ARTICLE 9 - GRIEVANCE & ARBITRATION PROCEDURE

SECTION 9.1 CLOSE COOPERATION

The Contractors, Unions, and employees, collectively and individually, realize the importance to all parties to maintain continuous and uninterrupted performance of Project Work and agree to resolve disputes in accordance with the grievance-arbitration provisions set forth in this Article.

SECTION 9.2 PROCEDURE

Any question, dispute or claim arising during the term of this Agreement involving the interpretation or application of this Agreement (other than jurisdictional disputes and alleged violations of Section 7.1, and Section 8.3(D)(2)), shall be considered a grievance and shall be resolved pursuant to the following procedure.

Step 1:

A. When any employee covered by this Agreement feels aggrieved by a claimed violation of this Agreement, the employee shall give notice of the claimed violation to the Local Union representative or job steward, who shall notify the Project Work site representative of the involved Contractor and the Construction Manager. To be timely, such notice must be in writing given within 7 calendar days after the act, occurrence or event giving rise to the grievance. Strict compliance with this 7-day notice is a condition precedent to proceeding with

such grievance. The Local Union representative or the job steward shall meet with the Project Work site representative of the involved Contractor and the Construction Manager and endeavor to adjust the matter within 7 calendar days after timely notice has been given. The representative of the involved Contractor shall keep the minutes of the meeting and shall respond to the Union representative in writing, with copy to the Construction Manager, within twentyfour (24) hours after the conclusion of the meeting. If they fail to resolve the matter within the prescribed period, the grieving party, may, within 7 calendar days thereafter, pursue Step 2 of the grievance procedure by serving the involved Contractor with written copies of the grievance setting forth a description of the claimed violation, the date on which the grievance occurred, and the provisions of the Agreement alleged to have been violated. Grievances and disputes settled at Step 1 are non-precedential except as to the specific Local Union, employee and Contractor directly involved, unless the settlement is accepted in writing by the Labor-Management Committee as creating a precedent with respect to Project Work.

B. Should any signatory to this Agreement have a dispute [excepting jurisdictional disputes and alleged violations of Section 7.1 or Section 8.3(D)(i) or (ii) with any other signatory to this Agreement and, if after conferring, a settlement is not reached within 7 calendar days, the dispute may be reduced to writing and the grieving party may proceed to Step 2 in the same manner as outlined in subparagraph (a) for the adjustment of employee grievances.

Step 2:

Upon timely receiving a written grievance, the involved Contractor shall notify and schedule a meeting with the Business Manager of the involved Local Union, the Council, and the Construction Manager, and their respective representatives, for the purpose of arriving at a satisfactory settlement. Such meeting shall be held within 7 calendar days of the involved Contractor's receipt of the written grievance. Meeting minutes shall be kept by the Contractor with copies to the parties within twenty-four (24) hours.

Step 3:

A. If the grievance shall have been submitted but not resolved in Step 2, any of the participating Step 2 entities may, within 21 calendar days after the initial Step 2 meeting, submit the grievance in writing (copies to other participants, including the Construction Manager) along with copies of the minutes from Step 1 and Step 2, to the acting Arbitrator under this procedure alternating between J. Pierson, Roger Moyer and Thomas Hines. The Labor Arbitration Rules of the American Arbitration Association shall govern the conduct of the arbitration hearing, at which all Step 2 participants shall be parties. The decision of the Arbitrator shall be final and binding on the involved Contractor, Local Union, and employees, and the fees and expenses of such arbitrations shall be borne equally by the

involved Contractor and Local Union.

B. Failure of the grieving party to adhere to the time limits set forth in this Article shall render the grievance null and void. These time limits may be extended only by written consent of the Construction Manager, the involved Contractor, and the involved Local Union at the particular step where the extension is agreed upon. The Arbitrator shall have authority to make decisions only on the issues presented to him and shall not have the authority to change, add to, delete or modify any provision of this Agreement.

X. ARTICLE 10 - JURISDICTIONAL DISPUTES

SECTION 10.1 ASSIGNMENT

The assignment of Project Work shall be solely the responsibility of the Contractor performing the Project Work involved, subject to the pre-job conference with the Council and the procedures set forth in Section 8.3(C), and such Project Work assignments shall be in accordance with the National Plan for the Settlement of Jurisdictional Disputes in the Construction Industry ("National Plan"), incorporated by reference into Schedule D, or any successor Plan approved by the Building & Construction Trades Department, AFL-CIO

SECTION 10.2 PROCEDURE FOR SETTLEMENT OF JURISDICTIONAL DISPUTES

All jurisdictional disputes involving Project Work shall be settled according to the National Plan, provided however, that disputes concerning intra-trade assignments (assignments between trades within the same International Union) will be determined by the applicable International Union.

SECTION 10.3 NO DISRUPTIONS

There will be no strikes, work stoppages, or slowdowns, arising out of any jurisdictional dispute. Pending the resolution of the dispute, the Project Work shall continue uninterrupted and as assigned by each Contractor. No jurisdictional dispute shall excuse a violation of Article 7.

SECTION 10.4 AWARD

Any jurisdictional award pursuant to this Article shall be final and binding on the disputing Unions and the involved Contractor on this Project only and may be enforced in any court of competent jurisdiction. Such award or resolution shall not establish a precedent on any other construction work not covered by this Agreement.

SECTION 10.5. LIMITATIONS

Awards made under this Article shall determine only to whom the disputed Project Work belongs. The deciding person or group hereunder shall have no authority to (a) assign Project Work to a double crew, that is, to more employees than the minimum required by the Contractor to perform the Project Work involved; (b) assign work to employees who are not qualified to perform the work involved; or (c) assign Project Work being performed by non-Union employees to Union employees. This provision does not prohibit the establishment, with the agreement of the involved Contractor, of composite crews where more than one (1) employee is needed for the job.

XI. ARTICLE 11 - WAGES AND BENEFITS

SECTION 11.1 CLASSIFICATION AND HOURLY RATE

All employees covered by this Agreement shall be classified in accordance with the work performed and paid the wage rates applicable for those classifications as required by the Schedule A applicable to the work. The term "straight time" in this Agreement shall mean the hourly wage rate applicable for those classifications as required by the applicable New York State Labor Law Section 220 ("Section 220") prevailing wage determination.

SECTION 11.2 EMPLOYEE BENEFITS

A. Unless expressly provided differently in this Agreement, Contractors agree to pay employee benefits/supplements on behalf of all of their employees covered by this Agreement in the amounts required by the applicable Section 220 schedule in effect. Except as provided herein, the Contractors agree that such payments shall be made to those established jointly trusteed employee benefit funds designated in the applicable Schedule A agreement, and in the amounts so designated, to the extent such payments are required by and satisfy the Section 220 obligation. Bona fide jointly trusteed fringe benefit plans established or negotiated through collective bargaining during the life of this Agreement may be added if they similarly fall within Section 220. Contractors not otherwise contractually bound to do so, shall not be required to contribute to non-Section 220 benefits, trusts or plans; however, this provision does not relieve Contractors which are signatory to local collective bargaining agreements with any Local Union from complying with the benefit requirements for all funds contained in those collective bargaining agreements.

B. Notwithstanding Section 1 1.2(A):

(1) Contractors who designate employees pursuant to Article 4 may satisfy the above benefits obligation with respect to those employees by: (1) providing those employees with coverage under their private benefit plans for health, welfare, pension, annuity and 40l(k); or (2) paying the full

amount of such benefit to the employee in employees' wages. The total benefit payments to be made on behalf of each such employee must equal the total Section 220 benefit/supplement amount. If the Contractor's contribution into the private benefit plan for the above funds is less than the amount required by Section 220, the difference must be paid to the employee in cash. Payments of other benefits covered under Section 220 shall be paid to the respective Unions on behalf of each employee.

- (2) This same option shall apply with respect to any other employee who is referred to the Contractor through the hiring hall process provided such employee was previously employed by the Contractor and was a participant in a bona fide private benefit plan maintained by the Contractor which satisfies the requirements of Section 220.
- (3) The option for a private plan equivalent supplement shall not apply to contributions into Joint Apprentice Training Committee (JATC), or similar apprentice funds designated in the applicable Schedule A agreement, if the Contractor does not have an apprentice training program approved by the Department of Labor (However, all Contractors with contracts for this Project in excess of \$500,000 must participate in apprenticeship training programs pursuant to New York State Labor Law §222(2)(e)). Upon request by the Council, any Contractor providing coverage under this provision will provide the Council with documentation of benefit payments made to individual employees during the term of their employment on the Project.
- (4) Contractors who exercise the option under Section 11.2(B) of this Article to pay into their own private benefit plans rather than the applicable jointly trusteed funds designated in the applicable Schedule A agreement shall be responsible for and guarantee employee benefit/supplement payments and shall indemnify and hold harmless the jointly trusteed funds designated in the applicable Schedule A agreement against any and all benefit/supplement claims by its employees.
- C. Contractors who contribute to jointly trusteed funds under this Section agree to be bound by the written terms of the legally-established jointly trusteed Trust agreements specifying the detailed basis on which payments are to be paid into, and benefits paid out of, such trust funds but only with regard to Project Work done and only for those employees for whom this Agreement requires such benefit payments. Notwithstanding the foregoing, a Contractor's liability shall be at all times limited to the amount of contributions required to be made to the Trust Funds.
- D. Each Contractor shall be responsible for and guarantee the payment of all required fringe benefits on the Project. The Local Unions and/or the Council shall notify

the Construction Manager within 120 hours excluding weekends whenever a Contractor or Subcontractor fails to make a required benefit payment and such delinquency remain outstanding after 30 days. Notification must be in writing and may be by email. If written notice of such a delinquency is received by the Construction Manager within that 120-hour period it shall withhold from any funds due to the delinquent Contractor the amount of that delinquency, up to the total amount due, until any dispute regarding the delinquency has been resolved. The Construction Manager shall have no other obligation with respect to contributions owed by any Contractor (or its Subcontractor); but that each Contractor shall continue to be obligated with respect to contributions based on Project Work done by that respective Contractor. If notice of a delinquency is not received by the Construction Manager within the required time periods, Owner shall have no basis upon which to withhold, with respect to that delinquency, any part of a payment which is otherwise due. Construction Manager shall require Contractors to submit proof of benefit payment with pay request.

XII. ARTICLE 12 - HOURS OF WORK, PREMIUM PAYMENTS, SHIFTS AND HOLIDAYS

SECTION 12.1 WORK WEEK AND WORK DAY

- A. Unless otherwise provided for in this Agreement, the standard work week shall be five days, Monday through Friday, eight hours per day plus½ hour unpaid lunch period each day. The starting time for the standard work week shall start at either 6:00 a.m., 6:30 a.m., 7:00 a.m., 7:30 a.m. or 8:00 a.m. Multiple starting times shall be allowed.
- B Four-tens: notwithstanding any other provision of the Agreement, when working a four-day work week, the work shall consist of 4 days, Monday through Thursday, ten hours per day plus ½ hour unpaid lunch period at the straight time rate. The starting time for four-tens shall be 6:00 a.m. 6:30 a.m. 7:00 a.m. A three-day minimal notice shall be required for four-tens to the respective involved Unions.
- C On a 5-day work week, Saturday may be used as a make-up day at straight time to fulfill the 40-hour work week due to inclement weather. On a 4-day work week, Friday may be used as a make-up day at straight time to fulfill the 40-hour work week. Make-up days shall be scheduled for a minimum of 8 hours, except in the case of inclement weather in which Section 12.5 shall apply. This minimum shall also apply when more than one shift or multiple shifts are worked.
- D. The changing of the regular starting time, except in the case of overtime and the switch from a 5- day and 4-day work weeks shall be a 4-week minimum.

SECTION 12.2 OVERTIME

Overtime pay for hours outside of the standard work week and work day, defined in Section 12.1, and all work on Saturdays shall be paid at time and one half the hourly rate and benefits will be paid on straight time. All work on Sundays shall be paid at two times the hourly rate and benefits will be paid at straight time.

SECTION 12.3 SHIFTS

- A. Flexible Schedules Scheduling of shift work, including Saturday and Sunday work, shall be within the discretion of the Contractor in order to meet Project Work schedules and existing Project Work conditions. Shifts must have prior approval of the Construction Manager and Owner and must be scheduled with not less than three work days' notice to the Local Union.
- B. Second and/or Third Shifts Saturday and/or Sunday Work.

The second shift shall start between 3 p.m. and 6 p.m. and the third shift shall start between 11 p.m. and 2 a.m. Shift differentials shall be straight time plus fifty percent (50%) of the applicable Schedule A agreement shift differential. No other premium or payments for such work shall be required unless such work is in excess of 40 hours during the week. There shall be no reduction in hours worked on a second and/or third shift, except that when 3 shifts are working together, the length of one or more shifts can be reduced to accommodate a 24-hour day and only actual hours worked will be paid. Work performed on Saturdays or Sundays shall be paid as provided in the applicable Schedule A Agreement.

C. To clarify above, Schedule A Shift Differential designated percentage rates vary according to each trade's prevailing Collective Bargaining Agreement. Shift work as part of this Project Labor Agreement is 50% of the designated percentage of the shift percentages of each trade, for example if a trade's shift differential is 15% it would be 7.5%.

SECTION 12.4 HOLIDAYS

- A. Schedule There shall be seven (7) recognized holidays:
 - New Year's Day,
 - President's Day,
 - Memorial Day
 - Fourth of July
 - Labor Day

- Thanksgiving Day
- Christmas Day

All said holidays shall be observed on the dates designated by New York State Law. In the absence of such designation, they shall be observed on the calendar date, except that holidays which occur on Sunday shall be observed on the following Monday and holidays which occur on a Saturday shall be observed on the previous Friday.

- B. Payment-Regular holiday pay, if any, for work performed on a recognized holiday shall be in accordance with the applicable Schedule A agreement. There will be no benefits paid on holidays unless worked.
- C. Exclusivity No holidays other than those listed in Section 12.4 shall be recognized or observed in relation to holiday pay and benefits.

SECTION 12.5 REPORTING PAY

- A. When on a five-day work week, employees who report to the work location pursuant to a regular schedule and who are not provided with work for whatever reason, shall receive two (2) hours reporting pay, four (4) hours if work starts and eight (8) hours pay if work occurs after the 4th hour except in the case of inclement weather in which hours worked after the four hours shall be paid and when on a four-day work week with a 10-hour day, (3), (4), (5) and (10) shall apply as per the same terms above.
- B. When an employee who has completed his or her scheduled shift and has left the Project site is "called out" to perform special work of a casual, incidental, or irregular nature, the employee shall receive pay for actual hours worked at applicable straight time or overtime rates in accordance with this Agreement, but no less than a minimum guarantee of two (2) hours at the employee's straight time rate.
- C. When an employee leaves the job or work location of their own volition, is discharged for cause, or is not working as a result of the Contractor's invocation of Section 12.8 below, he or she shall be paid only for the actual time worked.
- D. There shall be no pay for time not actually worked except as specifically set forth in this Article 12 and where an applicable Schedule A agreement applies to Forepersons, Stewards and Lead Engineer in reference to pay.

SECTION 12.6 PAYMENT OF WAGES

A. Payday: Payment shall be made by check, drawn on a New York bank with

branches located within commuting distance of the job site. Paychecks shall be issued by the Contractor at the job site by 3:00 p.m. on Thursdays. In the event that the following Friday is a bank holiday, paychecks shall be issued on Wednesday of that week. Not more than one week's wages shall be held back in any pay period. Paycheck stubs shall contain the name and business address of the Contractor, together with an itemization of deductions from gross wages.

B. Termination: Employees who are laid off or discharged for cause shall be paid in full for that which is due them at the time of termination. The Contractor shall also provide the employee with a written statement setting forth the date of layoff or discharge.

SECTION 12. 7 INJURY/DISABILITY

An employee who, after commencing Project Work, suffers a work-related injury or disability while performing Project Work duties, shall receive no less than eight (8) hours wages for that day. Further, the employee shall be rehired at such time as the employee is able to return to duties provided there is still Project Work available for which the employee is qualified and able to perform.

SECTION 12.8 EMERGENCY WORK SUSPENSION

A Contractor may, if considered necessary for the protection of life, property, and/or safety of employees or others, suspend all or a portion of Project Work. In such instances, employees shall be paid for actual time worked; provided however, that when a Contractor requests that employees remain at the job site available for Project Work, employees shall be paid for "stand- by" time at their hourly rate of pay.

XIII. ARTICLE 13 - APPRENTICESHIP & HELMETS TO HARDHATS

SECTION 13.1 APPRENTICE RATIOS

Recognizing the need to maintain continuing supportive programs designed to develop adequate numbers of competent workers in the construction industry and to provide craft entry opportunities for minorities, women, and economically-disadvantaged non-minority males, Contractors will employ apprentices in their respective crafts to perform such Project Work as is within their capabilities and that is customarily performed by the craft in which they are indentured. Contractors may utilize apprentices and such other appropriate classifications as are contained in the applicable Schedule A agreement in a ratio of not less than twenty-five percent (25%) of the work force by craft (without regard to whether a lesser ratio is set forth in the applicable Schedule A agreement), unless the applicable Schedule A agreement provides for a higher percentage. The first person assigned to the job shall be a Journeyman. The second person

assigned may be an apprentice. Subsequent assignments shall be Journeymen until the applicable ratio is achieved. This assignment shall be repeated until staffing needs are satisfied. Apprentices and such other classifications as are appropriate will be employed in a manner consistent with the provisions of the applicable Schedule A agreement.

SECTION 13.2 NYS DEPARTMENT OF LABOR- APPRENTICESHIP

To assist the Contractors in attaining a maximum effort on this Project, the Unions agree to work in close cooperation with, and accept monitoring by, the New York State Department of Labor to ensure that minorities and women are afforded every opportunity to participate in apprenticeship programs that result in the placement of apprentices on this Project.

SECTION 13.3 NEW YORK HELMETS TO HARDHATS

The Contractors and the Unions desire to facilitate the entry into the building and construction trades of veterans who are interested in careers in the building and construction industry. The Contractors and the Unions agree to utilize the services of the Center for Military Recruitment, Assessment and Veterans Employment (the "Center") and the Center's "New York Helmets to Hardhats" program as a resource for preliminary orientation and assessment of construction aptitude; referral to apprenticeship programs or hiring halls; counseling and mentoring; and support networks, employment opportunities, and other needs as identified by the parties.

The Unions and the Contractors agree to work with the Center to create and maintain an integrated database of veterans interested in working on the Project as well as information about apprenticeship and employment opportunities related to this Project. To the extent permitted by law, the Unions will give credit to such veterans for bona fide, provable past experience.

SECTION 13.4 PARTICIPATION GOALS (MBE, WBE, SDVOB, LABOR SURPLUS AREA)

- A. ORANGE ULSTER BOCES, Construction Manager, Contractors, the Hudson Valley Building and Construction Trades Council and its affiliated Unions are committed to meeting federal and New York State Participation Goals, if any are applicable to the Project, and shall be in alignment with the current goals or standards set for by federal or New York State requirements for Minority Business Enterprises (MBE), Woman Owned Business Enterprise (WBE), Service-Disabled Veteran Owned Business (SVDOB), and federal Labor Surplus Area requirements, to ensure participation on the project by MBE, WBE and SVDOB firms and job-seekers from federal Labor Surplus Areas (for 2022, City of Middletown, Town of Monroe, and City of Newburgh) while maintaining fiscal responsibility.
- B. Outreach by the Construction Manager, Contractors, Hudson Valley Building and Construction Trades and affiliated Unions and contractor associations to ensure

participation goals of NYS Certified MBE, WBE and SDVOB firms and Labor Surplus Area recruitment are met will be required through the project.

XIV. ARTICLE 14 - NO DISCRIMINATION

SECTION 14.1 COOPERATIVE EFFORTS

The Contractors and Unions agree that they shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, marital status, age, Union or non-Union status, real or perceived sexual orientation or any other status protected by law, in any manner prohibited by law or regulation. It is recognized that special procedures may be established by Contractors and Local Unions and the New York State Department of Labor for the training and employment of persons who have not previously qualified to be employed on construction projects of the type covered by this Agreement. The parties to this Agreement shall assist in such programs and agree to use their best efforts to ensure that the goals for female and minority employment are met on this Project. Nothing in this section shall be grieveable.

SECTION 14.2 LANGUAGE OF AGREEMENT

The use of the masculine or feminine gender in this Agreement shall be construed as including all genders.

XV. ARTICLE 15 - GENERAL TERMS SECTION 15.1 PROJECT RULES

SECTION 15.1 PROJECT RULES

- A. ORANGE ULSTER BOCES, the Construction Manager and Contractors may establish from time to time such reasonable Project rules as are necessary for the good order of the Project. These rules shall be outlined at the pre-job conference with the Council, detailed in the contract documents, approved by the President of the Council, posted at the Project site, and may be amended thereafter as necessary.
- B. Security Protocols The Construction Manager with Owner's approval and in their sole discretion, will determine security protocols for the entire Project Site. Strict compliance by all Contractors and subcontractors of all tiers and their respective personnel with security procedures, protocols, and directives issued by these entities or its delegated, is required at all times.

SECTION 15.2 TOOLS OF THE TRADE

The welding/cutting torch and chain fall are tools of the trade having jurisdiction over the Project Work performed. Employees using these tools shall perform any of the Project Work of the trade. There shall be no restrictions on the emergency use of any tools or equipment by any qualified employee or on the use of any tools or equipment for the performance of Project Work within the employee's jurisdiction.

SECTION 15.3 SUPERVISION

Employees or other personnel shall work under the supervision of the craft foreperson or general foreperson for the applicable hiring or subcontracting Contractor

SECTION 15.4 FULL WORKDAY

- A. Employees shall be at their Project Work area at the starting time established by the Contractor.
- B. The signatories to this Agreement reaffirm their policy of a fair day's work for a fair day's wage.

XVI. ARTICLE 16 - SAFETY PROTECTION OF PERSON AND PROPERTY

SECTION 16.1 SAFETY REQUIREMENTS

Each Contractor will ensure that applicable OSHA and New York State mandated safety requirements are at all times maintained on the Project and the employees and Unions agree to cooperate fully with these efforts. Employees must perform their Project Work at all times in a safe manner and protect themselves and the property of the Contractor from injury or harm. Failure to do so may be grounds for discipline, including discharge. Prevention of accidents at the site is the responsibility of the Contractors, its employees, subcontractors and suppliers, persons, and entities at the Project Site. The Contractors shall establish their own safety programs implementing safety measures, policies, and standards conforming to those required or recommended by governmental and quasi-governmental authorities having jurisdiction.

The Construction Manager is not responsible for identifying unsafe practices, nor for failure to stop the Contractors' unsafe practices; and the Construction Manager's failure to stop the Contractors' unsafe practices shall not relieve the Contractors of the responsibility therefore.

SECTION 16.2 CONTRACTOR RULES

Employees covered by this Agreement shall at all times be bound by the reasonable safety, security, and visitor rules as established by the Owner. Such rules will be referenced in the Contract Documents and may be distributed to Contractors for further distribution to personnel and/or posted in conspicuous places throughout the Project.

SECTION 16.3 INSPECTIONS

The Contractors, Owner, Architect/Engineer, and Construction Manager retain the right to inspect incoming shipments of equipment, apparatus, machinery, and construction materials of every kind.

XVII. ARTICLE 17 - TEMPORARY SERVICES

Temporary light, power, cooling, ventilation and other services shall only be required on the specific request of a Contractor and when requested shall be assigned in accordance with the Contract Documents. Temporary coverage may be provided by the supplying Contractor's employees already working under this Agreement during regular work hours. The supplying Contractor will determine the need for temporary coverage requirements during non-work hours. For safety reasons, temporary light and power panels will only be accessed by employees of the Contractor responsible for supplying the temporary light and power panels. Coverage requirements shall not require a standby employee who is not performing Project Work. There shall be no stacking of trades on temporary services. In the event temporary services are claimed by multiple trades, the matter shall be resolved pursuant to Article 10.

XVIII. ARTICLE 18 - SAVINGS AND SEPARABILITY

SECTION 18.1 THIS AGREEMENT

In the event that the application of any provision of this Agreement is enjoined, on either an interlocutory or permanent basis, or is otherwise determined to be in violation of law, the provision involved (and/or its application to a particular part of the Project, as necessary) shall be rendered, temporarily or permanently, null and void, but the remainder of the Agreement shall remain in full force and effect to the extent allowed by law. In the event a court of competent jurisdiction finds any portion of the Agreement to be invalid, the parties will immediately enter into negotiations concerning the substance affected by such decision for the purpose of achieving conformity with the court determination and the intent of the parties hereto for contracts to be let in the future.

SECTION 18.2 NON-WAIVER

Nothing in this Agreement is intended to be or shall be construed as a waiver by any

Union(s) of any prevailing wage determination or schedule that is applicable to their trade for any public work that has been or may be performed in the future on any work outside the scope of this Agreement. Nothing contained in this Agreement is intended to be or shall be construed as a waiver by any Union(s) of any more favorable term or condition of employment that may be contained in any collective bargaining agreement applicable to work outside the scope of this Agreement.

XIX. ARTICLE 19 - FUTURE CHANGES IN SCHEDULE A AREA CONTRACTS

SECTION 19.1 CHANGES TO AREA CONTRACTS

Each Schedule A agreement incorporated by reference into this Agreement by Schedule A shall continue in full force and effect until the Contractor and/or Union parties to the area collective bargaining agreements which are the basis for the applicable Schedule A agreement, notify the Owner and Construction Manager in writing of the agreed upon changes in the Schedule A agreement which is applicable to the Project, and their effective dates. Such changes shall only be effective to the extent consistent with this Agreement. Any disagreement between signatories to this Agreement over the incorporation into Schedule A of provisions agreed upon in the renegotiation of area collective bargaining agreements shall be resolved in accordance with the procedure set forth in Article 9 of this Agreement.

SECTION 19.2 LABOR DISPUTES DURING AREA CONTRACT NEGOTIATIONS

The Unions agree that there shall be no strikes, work stoppages, sympathy actions, picketing, slowdowns or other disruptive activity or other violations of Article 7 affecting the Project by any Local Union involved in the renegotiation of area local collective bargaining agreements, nor shall there be any lock-out on this Project affecting a Local Union during the course of such renegotiations.

XX. ARTICLE 20 - PROJECT SPECIFIC

SECTION 20.1 WORKERS COMPENSATION ADR

At the written option of the Contractor and with the written approval of the Hudson Valley Building Trades Council, all Local Unions, Contractors and subcontractors working on this Project agree to be bound by the Collectively Bargained Workers Compensation Alternative Dispute Resolution Agreement (ADR Agreement), incorporated by reference into Schedule F to this Agreement, and to the ADR program set forth therein, by and between the Construction Industry Council of Westchester and the Hudson Valley, Inc., and the Building and Construction Trades Council of Westchester and Putnam County, New York, entered into on January 26, 2007,

as amended.

SECTION 20.2 HUDSON VALLEY BUILDING AND CONSTRUCTION TRADES LABOR MANAGEMENT ALLIANCE

If not prohibited by law, to the parties to this Agreement, the parties agree to participate in the Hudson Valley Building and Construction Trades Labor Management Alliance.

SECTION 20.3 CLEAN UP

A clean work site results in a safe and more productive job site. All cleanup during construction shall be performed by the trade having jurisdiction for cleanup in accordance with the Project Contract Documents. The Owner will ensure a clean and safe workplace. The Owner or Construction Manager may back charge Contractors accordingly if clean up becomes unsatisfactory.

Once construction is complete and a building, section or floor is turned over to a professional cleaning company for final cleaning, including but not limited to, windows and floor prep, up to 33.3% of the Employees may be a direct employee of the cleaning company. Those direct employees shall be exempt from this Agreement.

SECTION 20.4 FURNITURE, FIXTURES AND EQUIPMENT (FFE)

Project work related to furniture, fixtures, and equipment that is free standing and requires no onsite assembly and is not fastened, mounted, anchored, hardwired or hard piped to any part of the building structure or surface by glue, screws, nails, mechanical fastener or by any other means is excluded from this agreement. Accordingly, for avoidance of doubt, all unloading, handling, assembly, installation and clean up of all furniture, fixture, and equipment which requires fastening, mounting, anchoring, hardwiring or hard piped to any part of the building structure or surface by glue, nails, screws, mechanical fasteners, wire, pipe or by other means, or requires any onsite assembly shall be included project work under this agreement.

When the owner or construction manager directs or contracts excluded work under this Section (20.4) to be performed this Agreement shall apply.

EXCLUDED WORK SHALL INCLUDE:

The installation of all data cabling and components, security/fire alarm systems, audio visual equipment including all associated "low voltage" electrical connections is excluded. It is noted that the installation of all conduits, piping or wiring within the walls, floors and ceilings is included within the work of this agreement. A pre-job meeting between the vendors, electrical contractor, construction manager and IBEW shall be scheduled prior to any work related to the excluded work above begins. Movable partitions motorized and non-motorized are also excluded.

IN WITNESS WHEREOF the parties have caused this Agreement to be executed and effective as of the day of September 2023.

FOR THE HUDSON VALLEY BUILDING AND CONSTRUCTION TRADES COUNCIL:

ву: А.Тоээ

L. Todd Diorio, President

ORANGE - ULSTER BOCES:

By: Enginis Panch

Eugenia Pavek, President of Cooperative Board

FOR CONSTRUCTION MANAGER:

By:

Luis Rodriguez, President, the Palombo Group

FOR LOCAL UNIONS:

International Union of Bricklayers and Allied Craftworkers Local NO. 1:

Signed:	Title:
Email:	
International Brotherhood Helpers District NO. 5:	of Boilermakers, Iron Ships Builders, Blacksmiths, Forgers
Signed:	Title:
Email:	
Bricklayers and Allied Craft Local NO. 7:	ts, Tile, Marble & Terrazzo Union of New York & New Jersey
Signed:	Title:
Email:	Phone:
Bricklayers United Union of	Roofers, Waterproofers and Allied Workers Local NO. 8:
Signed:	Title:
Email:	
District Council NO. 9, Inter	national Unio. of Painters and Allied Trades, A.F.L-C.1.0:
Signed:	Title:
Email:	Phone:

Laborers International Union of N.A. Local 17:

Signed:	Title:	_
Email:		
International Association of Local NO. 38:	Sheet Metal, Air, Rail and Transportation Workers (SMAR	(T)
Signed:	Title:	_
Email:		
International Association of I	HBAT and Frost Insulators and Allied Workers Local NO. 91	:
Signed:	Title:	_
Email:	Phone:	
International Union of Eleva	ors (IUEC) Local NO. 138:	
Signed:	Title:	_
Email:		
O.P.C.M.I.A. Plasters Union	Local NO. 262:	
Signed:	Title:	_
Email:		

North Atlantic States Regional Council of Carpenters Local NO. 279:

Signed:	Title:	
Email:		
International Brotherhood of	Electrical Workers Local NO. 363:	
Signed:	Title:	
Email:	Phone:	
Plumbers, Steamfitters & Ser	vice Technicians Local NO. 373:	
Signed:	Title:	
Email:	Phone:	
International Association of Local NO. 417:	Bridge, Structural, Ornamental and Reinforcing Iron Wor	kers
Signed:	Title:	
Email:	Phone:	
International Brotherhood of	Teamsters Local Union NO. 445:	
Signed:	Title:	
Email:	Phone	

Road Sprinkler Fitters Union Local NO. 669:

Signed:	Title:	
Email:		
New York City District Carp	enters Local NO. 740 & Local NO. 2287:	
Signed:	Title:	
Email:		
United Cement Masons Loca Signed:		
Signed:		
	ating Engineers Local NO. 825:	
Signed:	Title:	2
Email:	Phone:	

SECTION 008700 - WAGE AND HOUR RATES

1.1 GENERAL

- A. The following minimum wage rates, health and welfare and pension fund contributions are as determined by the Industrial Commissioner of the State of New York in accordance with the provisions of Section 220 of the Labor Law.
- B. All contractors will be bound and obligated by the Laws of New York State to ensure payment to all workers involved with the construction of the Project.

1.2 MINIMUM WAGE RATES

The "Request for Wage and Supplement Information" (PW 39) you have submitted has been accepted, and a Prevailing Rate Case Number (PRC# 2023003549 - Interior Alterations 3rd fl.) has been assigned to the project.

To access the PDF file of your schedule, click on https://apps.labor.ny.gov/wpp/publicViewProject.do?method=showlt&id=1547310 or copy and paste into your browser

Kathy Hochul, Governor

Orange Ulster BOCES

Teresa Jarrard 285 Main Street Mount Kisco NY 10549

Schedule Year Date Requested PRC#

2022 through 2023 03/27/2023 2023003549

Roberta Reardon, Commissioner

Location 4 Harriman Drive Project ID# 2023-1008

Project Type Regional Education Center at Arden Hill interior alterations

PREVAILING WAGE SCHEDULE FOR ARTICLE 8 PUBLIC WORK PROJECT

Attached is the current schedule(s) of the prevailing wage rates and prevailing hourly supplements for the project referenced above. A unique Prevailing Wage Case Number (PRC#) has been assigned to the schedule(s) for your project.

The schedule is effective from July 2022 through June 2023. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.ny.gov. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

It is the responsibility of the contracting agency or its agent to annex and make part, the attached schedule, to the specifications for this project, when it is advertised for bids and /or to forward said schedules to the successful bidder(s), immediately upon receipt, in order to insure the proper payment of wages.

Please refer to the "General Provisions of Laws Covering Workers on Public Work Contracts" provided with this schedule, for the specific details relating to other responsibilities of the Department of Jurisdiction.

Upon completion or cancellation of this project, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice. OR fill out the electronic version via the NYSDOL website.

NOTICE OF COMPLETION / CANCELLATION OF PROJECT			
Date Completed:	Date Cancelled:		
Name & Title of Representative:			

Phone: (518) 457-5589 Fax: (518) 485-1870 W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

- 1. Introduction
- 2. Work Covered by Contract Documents
- 3. Type of Contract
- 4. General Project Information and Requirements
- 5. Work Under the Contract
- 6. Work Not Included
- 7. Owner Furnished, Contractor Installed Products and Equipment
- 8. Additional Scoping
- 9. Coordination
- 10. Use of Premises
- 11. Asbestos and Lead Paint Awareness Requirements
- 12. Occupancy Requirements
- 13. Construction Time and Phasing Requirements
- 14. Proof of Orders and Delivery Dates
- 15. Intent of Documents
- 16. Field Measurements
- 17. Initial Submittal Requirements
- 18. Quality Requirements
- 19. Waste Management Procedures and Definitions
- 20. Owner Occupancy Requirements
- 21. Regulations of the Commissioner of Education
- 22. Payrolls and Payroll Records
- 23. Project Milestone Schedule

B. Related Sections include the following:

- 1. Division 01 Section "Project Management and Coordination" for specific coordination requirements.
- 2. Division 01 Section "Temporary Facilities and Controls" for specific requirements for temporary facilities and controls.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Project consists of all labor, materials, equipment, appliances, services, and incidentals necessary for layout, installing, and performing Alterations at the Third Floor of the Arden Hill Regional Education Center as shown on the Contract Drawings and described in the Specifications.
 - 1. The Work consists of renovations to the existing Third Floor of the Arden Hill Regional Education Center Building for creation of educational spaces included general construction, plumbing, HVAC, and electrical work.

- 2. The Work will be performed at the Arden Hill Regional Education Center located at 4 Harriman Drive, Goshen, NY 10924.
- B. Architect Identification: The Contract Documents were prepared for Project by KG+D Architects, PC.
- C. Construction Manager: The Palombo Group has been engaged as Construction Manager for this Project to serve as an advisor to Owner and to provide assistance in administering the Contract for Construction between Owner and Contractor, according to a separate contract between Owner and Construction Manager.

1.3 TYPE OF CONTRACT

A. Bids shall be received in accordance with the New York State Public Bidding Laws, this project will be executed under SINGLE PRIME CONTRACT as noted below:

Contract No. 1 - General Construction

B. The contractor shall furnish all labor, material, tools, equipment, supervision, layout, delivery, trucking, shop drawings, submittals, closeout etc. necessary to complete the work described in the Division of Work and based upon a complete set of Contract Documents.

1.4 GENERAL PROJECT INFORMATION AND REQUIREMENTS

- A. One set of Documents is issued covering the entire contract. Contractor shall review all drawings and specifications for complete understanding and knowledge of entirety of the Work. Attention is directed to the fact that a single set of documents exist for the construction of the Project as a whole and the delineation of the responsibilities serves as outlines only and all such work necessary and/or required to complete the individual trade obligations will be deemed to be included within said trade scope of work. Work on each sheet, or within any technical specification section may or may not have an effect on the work of any single trade. Failure on the part of any Contractor or subcontractor to examine all documents will not be cause for additional cost to the Owner.
- B. The Contractor has been given the opportunity prior to bid to inspect the entire Project site for interferences to their Contract work and agrees to accept the site as it exists on the date of the bid opening.

Existing conditions are shown on the drawings to the best knowledge of the Architect. The Architect, however, cannot guarantee the correctness of the existing conditions shown and assumes no responsibility therefore. It shall be the responsibility of the Contractor to visit the site and verify all existing conditions.

- C. ADDITIONAL SECURITY PROVISIONS, COORDINATE WITH ARTICLE 3 OF SECTION 007000 AND SECTION 011501
 - 1. It is the Owners intention to occupy the existing buildings and site for normal School operations during the construction process.
 - 2. All Contractors' employees shall use a single means of access and egress, 011000 SUMMARY

- except in the case of emergency, to be designated by the Contractor and coordinated with the Construction Manager and Owner.
- 3. Each Contractor and each Subcontractor shall require his employees, while on the job site, to wear, in a conspicuous location, a Photo I.D. badge bearing the name of the individual and the Contractor for whom working. The badges of each Contractor shall be numbered consecutively. An up-to-date list of all I.D. badges, indicating the name and number along with a copy of the photograph for each employee, shall be furnished to the Construction Manager and Owner.

D. The Contractor shall:

- 1. Coordinate construction schedule information in order to formulate one master schedule for the entire Project. Contractor to organize, publish and update said schedule as direct by the CM, but no less than bi-monthly (twice per month).
- 2. Coordinate weekly construction schedules and activities. Every week the Contractor is to submit to the CM and other subcontractors a detailed plan of activities in the field to include, but not be limited work planned, crew size, hours of work, deliveries, coordinated activities with others, Owner requested coordination needs. Contractor shall take responsibility for submitting this on account for all of their vendors and subcontractors.
- Provide reflective vests and other necessary PPE to be worn by all on-site personnel at all times. Parties that do not abide by this requirement will be escorted off the premises.
- 4. Provide potable drinking water for its own employees.
- 5. Provide access to all concealed systems as required for system maintenance and repair for items installed in their Contract. This specifically talks to access panels needed for future maintenance by the district.
- 6. Provide and maintain material lifting equipment required for the completion of their Contract requirements, and complying with NYS Labor Laws, OSHA Regulations, and other Federal, State, and local laws.
- 7. Provide and maintain additional temporary stairs, ladders, ramps, scaffolding, and platforms required specifically for completion of work of their own Contract, and as further detailed in this section. All work needs to comply with the NYS Labor Laws, OSHA regulation, and other Federal, State, and local laws.
- 8. Provide Fire Prevention materials and equipment for fire protection related to the work of their own Contract. Provide fire extinguishers, fire blankets, and fire watch during all cutting and welding operations.
- 9. Provide any supplemental lighting required to install the work of its own Contract, beyond the minimum OSHA levels
- 10. Provide any supplemental heat required to install the work of its own Contract
- 11. Provide traffic control for deliveries, and equipment needed to perform the work of their own Contract.
- 12. Provide protection of its own finished Work, after installation, until accepted by the Owner.
- 13. Provide fire caulking for any penetration related to the work for its own Contract.
- 14. Provide any office and storage trailers required to complete the work of their own Contract.

- 15. Provide final cleaning of all surfaces and areas within the work areas to the satisfaction of the CM.
- 16. Project closeout requirements including As-Builts, Owner's Manual, Training etc.
- 17. The Contractor shall review the facility asbestos report to become familiar with any materials that may contain asbestos. If the contractor encounters materials that have not been tested for asbestos, he shall cease work and contact the Construction Manager. The Contractor will be held responsible for clean-up costs if they continue to remove materials that have not been tested for asbestos.
- 18. Provide for a thorough final cleaning of the site, building, and equipment provided under their Contract immediately before the final inspection. The Contractor is responsible for cleaning and dust and debris generated from the work of their own Contract.
 - a. Maintain areas in a clean condition until the Owner occupies the space.
 - b. Personnel: Experienced workman or professional cleaners approved by the Construction Manager.

1.5 WORK UNDER THE CONTRACT

- A. The project will be constructed under a single contracting arrangement.

 One set of documents is issued covering all scope of work. The Contractor is to review ALL drawings and specifications for complete understanding and knowledge of the work to be performed.
- B. The following Contract Documents are specifically included and defined as integral to the Prime Contract.
 - 1. Bidding Requirements
 - 2. Performance and Payment Bonds
 - 3. Conditions of the Contract, including
 - 4. General Conditions & Supplementary Conditions
 - 5. Insurance Requirements
 - 6. NYS Prevailing Wage Rates
 - 7. Project Labor Agreement
- C. Extent of Contract: Unless the Contract Documents contain a more specific description of the Work, names and terminology on Drawings and in Specification Sections determine which contract includes a specific element of Project.
 - 1. Unless otherwise indicated, the Work described in this Section for the contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
 - Local custom and trade-union jurisdictional settlements do not control the scope of the Work of the contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, affected contractors shall negotiate a reasonable settlement to avoid or minimize interruption and delays.
 - 3. It is implied, unless otherwise noted, that any new work that has existing work in its place, the removal of the existing work is included in the scope of new work installer.

- 4. All contractors are responsible for the removal and reinstallation of ceilings where work must be installed above a ceiling not scheduled for removal.
- 5. Concrete Work shall be provided by the contract for its own Work, unless specifically assigned to another Contract.
- 6. The Contractor shall provide all cutting and patching, wall and floor trenching, etc. associated with the work. All patching/restoration is to be performed by mechanics qualified and experienced with the materials and finishes being patched. New openings requiring structural reinforcing will be the responsibility of the Contractor. Core drilling, fire proofing etc. shall be by Contractor. Layout to be performed by the Contractor requiring the opening.
- 7. Firestopping for the Work of the contract shall be provided by the contract for its own Work. Firestopping shall comply with Division 7 Section "Through Penetration Firestop Systems".
- 8. Access doors not shown on Architectural drawings and required for access to junction boxes, valves and similar equipment for the Work of the contract shall be furnished by the contract for its own Work for installation.
- Lead Based Paint precautions for the Work of the contract shall be provided by the contract for its own Work. The Contractor shall provide procedures for OSHA Lead precautions.
- 10. The Contractor shall designate a full-time superintendent to supervise the work of all work scope installation, who shall always be present on the job site when work is being performed by their Contract; this person shall be familiar with Project and authorized to conclude matters relating to progress. This person shall also represent their company at weekly contractor meetings.
- 11. Termination and removal of its temporary facilities shall be provided by the contract for its own Work.
- 12. The Contractor shall provide temporary power and lighting at the areas of work for all trades within the building, as required for the duration on construction.
- D. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section and in Division 1 Section 015000 "Temporary Facilities and Controls," the Contractor is responsible for the following:
 - 1. Installation, operation, maintenance, and removal of each temporary facility usually considered as its own normal construction activity, and costs and use charges associated with each facility.
 - Generators, 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 field office, complete with necessary furniture, and telephone service.
 - Its own storage and fabrication sheds.
 - 5. Temporary heat for construction at isolated work areas.
 - 6. Its own dust protection to control dust where dust partition is not scheduled or shown on the drawings but are necessary to protect the building from dust contamination. This shall include temporary walls, zip walls, portion walls, as needed or as directed by the CM to contain dust.
 - 7. Temporary enclosures for its own construction activities.
 - 8. Hoisting requirements for its own construction activities.
 - 9. Staging and scaffolding for its own construction activities.

- 10. Collection and disposal of its own hazardous, dangerous, unsanitary, or other harmful waste material.
- Daily clean-up and disposal are required by the Contractor for the periods during which that Contractor is performing work on site. Dumpsters are to be provided by the Contractor for use by the contractors, recycling of materials will be instituted daily. Each trade will assign at least one person to the weekly general clean-up. Any Contractor not providing personnel will be "back-charged" for labor provided by the Construction Manager. Progress cleaning of its own areas on a daily basis.
- 12. Secure lockup of its own tools, materials, and equipment.
- 13. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
- 14. Temporary heat to protect to install and protect the work is place where scheduled temporary heat is not in place or not called for in the contract documents.
- 15. Safety procedures as dictated by the district, OSHA, and the NYS Department of Labor
- E. Temporary Heating, Cooling, and Ventilation: The Contractor is responsible for temporary heating, cooling, and ventilation before permanent enclosure of building is complete and/or when a system is removed or otherwise disabled. The Contractor is responsible for temporary heating, cooling, and ventilation after permanent enclosure of building is complete and Owner will pay utility-use charges.
- F. Temporary ventilation: The Contractor to control fumes from their own construction operations including interior panting and "off gassing" of new finish materials.
- G. Use Charges: Comply with the following:
 - 1. Water Service: Water service is available at no charge.
 - 2. Electric Power Service: Electric Power service is available at no charge. Except when power shut down to the building occurs, the EC is to provide temp power to facilitate the ongoing work of other trades.
- H. Storage: The Contractor shall coordinate with the Construction Manager for locations of on-site storage for material, employee parking, material loading/loading etc. It is the intent of the Project to store approved delivered material on site. Any storage required for material, tools, and equipment outside the summer schedule is the responsibility of the Contractor. Material available and not on site will not be a basis for delay.

1.6 WORK NOT INCLUDED

- A. The following items are not included in the Work covered by the Contract:
 - 1. Items marked N.I.C.
- 1.7 OWNER-FURNISHED, CONTRACTOR INSTALLED PRODUCTS AND EQUIPMENT
 - A. Owner will furnish products indicated. The Work of the Contractor includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and

making building services connections.

- B. Owner-Furnished, Contractor Installed Materials and Equipment Includes:
 - 1. The following toilet accessories: paper towel dispenser, soap dispenser, toilet paper dispenser.
 - 2. Public Address & Clock System
 - a. The Contractor shall install infrastructure items, such as conduit, supports, cable/wire, terminations, identification, cable testing
 - b. The Owner (Day Automation) shall supply final technology devices, panels, headend equipment and installation and testing for a complete system
 - 3. Fire Alarm
 - a. The Contractor shall install infrastructure power needs for main/sub panels
 - b. The Contractor shall install infrastructure items, such as conduit, supports, cable/wire, identification, cable testing
 - c. The Owner (ADT) shall supply final devices, panels, headend equipment, installation and testing for a complete system
 - 4. Lockdown System
 - a. The Contractor shall install infrastructure items, such as conduit, supports, cable/wire, identification, cable testing
 - b. The Owner (Eastern Datacom) shall supply final devices, panels, headend equipment, installation and testing for a complete system
 - 5. Security Cameras
 - a. The Contractor shall install infrastructure items, such as conduit, supports, cable/wire, identification, cable testing
 - b. The Owner (Day Automation) shall supply final devices, panels, headend equipment, installation and testing for a complete system
 - 6. Classroom Smart Boards
 - a. The Contractor shall install infrastructure items, such as conduit, supports, cable/wire, terminations, identification, testing
 - b. The Owner (School District) shall supply final devices, panels, headend equipment, installation and testing for a complete system
 - 7. Phones
 - a. The Contractor shall install infrastructure items, such as conduit, supports, cable/wire, terminations, identification, cable testing
 - b. The Owner (School District) shall supply final technology devices, panels, headend equipment and installation and testing for a complete system
 - 8. Building Management System Controls
 - a. The Contractor shall install infrastructure power needs for main/sub panels
 - The Owner (Trane) shall furnish and install Spec Section 23 0900 and 23 0993
 - c. The Contractor shall coordinate with BMS provider on access, coordination drawings, submittals, infrastructure requirements, installation schedule, to ensure all required points are maintained for control.
 - 9. Access Control / Door Hardware
 - a. The Contractor shall provide and install doors, frames, glazing, accessories, trim, saddles etc.
 - The Contractor shall install infrastructure items, such as conduit, supports, cable/wire, terminations, identification, cable testing for access readers 011000 - SUMMARY

- c. The Owner (Day Automation) shall provide all hardware sets
- d. The Contractor shall install all Owner provided hardware sets
- e. The Owner (Day Automation) shall supply final technology devices, panels, headend equipment and installation and testing for a complete system
- 10. Classroom Furniture
 - a. The Owner (School District) shall provide and install all furniture

1.8 ADDITIONAL SCOPING

Definition of Extent of Contract Work; Additional Contract Work not previously described.

- Scopes of work referenced may be found in multiple locations throughout the plans and specifications and addendums. Contractors will confirm their own bid set of documents
- Local customs and trade union jurisdictional settlements do not control the scope
 of work included in the contract. When a potential jurisdictional dispute or similar
 interruption of work is first identified or threatened, the affected prime contracts shall
 promptly negotiate a reasonable settlement to avoid or minimize the pending
 interruption and delays.
- 3. All OSHA safety and hazardous materials regulations will be enforced on this project. All Contractors must submit a safety program, a hazardous materials program, (all required data must be maintained at the job site) and attend safety meetings. Toolbox talks will be required from each prime/sub contractor.
- 4. All Contractors are responsible for any debris caused by their work. A daily clean-up and disposal is required by each Contractor for the periods during which that Contractor is performing work on site, on a day selected by the Construction Manager. Each trade will assign at least one person to the weekly clean-up; the name of this person is to be submitted to the Construction Manager. Any Contractor not providing personnel will be "back-charged" for labor provided by the Construction Manager.
- 5. All Contractors are responsible for coordinating cutting/patching required to complete their work. All exposed finishes must be ready to receive paint, etc.; all concealed openings (piping, ductwork, conduit, etc.) must be repaired to comply with specified wall or deck conditions.
- 6. Multiple Crews: To maintain the project schedule, the Contractor is to provide multiple crews as required. Each crew is to be furnished with its own supervision, equipment, access and other means necessary to maintain the Project Milestone Schedule.
- 7. Supervision: The proposed project manager and field superintendent for the project is to have at least five years' experience in the proposed position. Each successful bidder shall submit resumes to the Construction Manager for the proposed project manager and field superintendent for the project. This information will be reviewed with the Owner, Architect and Construction Manager for approval. Should the Project Manager and/or Superintendent prove unqualified for the position at any point in the project, the Construction Manager shall issue a letter stating that the person is to be removed from involvement in the project. Action by the contractor must be made within seven working days of receipt of such letter.
- 8. The Contractor shall return areas disturbed by their work activities to condition prior to start of work.
- 9. The Contractor shall maintain within its field office a complete and current set of Contract Documents (including any Addenda, Change Orders, and Modifications

- thereto), approved shop drawings, samples, color schedules and other data pertinent to the Project.
- 10. The Contractor is to survey existing work and submit to the Construction Manager a list of damaged areas (i.e., plaster walls, woodwork) prior to commencing work. Any damaged areas not identified prior to the work shall be the responsibility of the contractor/ Contractors working in that area. The Construction Manager will have photos of existing conditions on file for reference. Failure to submit these photos, Contractor agrees that the location is free of damage/defect prior to the start of work.
- 11. The Contractor is required to submit a construction schedule based on the milestone dates to the Construction Manager for review and comment no later than 2 weeks after a Notice to Proceed for the work is issued. Other sub-contractors have 5 days to complete their construction and submittal schedules after the Construction Manager distributes the Contractor's schedule. The Contractor will continue to develop the schedule until all input is entered and agreed upon.
- 12. Unless a specific item or material is noted as to remain the Owner's property or to become the Contractor's property (or similar words), any material having salvage or reuse value shall be inspected by the Owner. If the Owner wishes to retain this material, it shall be turned over to him on the site where directed. If the Owner designates the material as scrap, it shall become the Construction Manager's property and removed from the site by the Contractor. Material having salvage value shall be carefully removed. If the Construction Manager designates the material as scrap, it shall become the contractor's property and removed from the site by the contractor. Material having salvage value shall be carefully removed.
- 13. When the building is occupied and fire alarm and safety system work is in progress, the Contractor shall continuously maintain the existing building's fire alarm and detection system and exit, and emergency lighting system or provisions must be made by the Contractor to provide equivalent safety. Contractor must notify the Owner of any non-operating systems.
- 14. All personnel required to be on site shall at all times have all required personnel protective equipment on at all times.
- 15. All personnel on site shall at all times have a photo ID displayed where visible. Those without will be removed from site at once. If the same individual fails to have the ID a second time they will be removed from the site and not be allowed back on site.

16. TESTING

- Required testing and test procedures are indicated under each Division of the Technical Specifications. Other testing shall be performed per generally accepted standards.
- b. The Architect shall reserve the right to require additional information as is deemed necessary to fully evaluate testing results.
- c. The Owner shall employ and pay for an independent testing and inspection agency for testing requirements of their work as assigned by this scope of work. All testing shall be per technical specification requirements The Contractor requiring testing will notify the Construction Manager 48 hours in advance of the required testing to allow for coordination and scheduling. Failure to give sufficient notice will require the Contractor to pay for alternate testing to satisfy the specification.
- 17. Each Contractor shall inspect the site and review the AHERA report on file for the presence of asbestos. Unless otherwise noted, there will be asbestos containing

material in place that will require work to take place in the vicinity of, around and/or next to. The Contractor that will be working above ceilings, demolishing, in crawl spaces, boiler rooms and all other areas that may contain asbestos per the AHERA report, shall employ "Allied Trades: certified/licensed tradesman as part of the onsite workforce."

1.9 COORDINATION

- A. Coordinate scheduling, submittals, and Work of various sections of specifications to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirement characteristics of operating equipment are compatible with building utilities.
- C. Coordinate space requirements and installation of mechanical and electrical work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable.
- D. In finished areas, conceal pipes, ducts, and wiring within construction.

1.10 USE OF PREMISES

A. Use of Buildings and Sites:

- 1. It is the Owners intention to occupy the existing buildings and site for normal School operations during the construction process. Allow for Owner occupancy of adjacent interior spaces, buildings and sites and areas for use by the public. Conduct the Work to provide the least possible interference to the activities of the Owner's personnel and use of the buildings and sites by the public
- 2. Limits: Confine constructions operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated. All areas of the site with the exception of the project area where the Work is being performed are off limits to Contractor and his employees.
- 3. Access to Building: Contractors' employees shall use a single means of access and egress, except in the case of emergency, to be designated by the Owner.
- 4. Contractors shall cooperate with the Owner's personnel in maintaining and facilitating access to the School buildings and its facilities by the School staff, Students, Owner's agents, service consultants and the public, throughout the construction process.
- 5. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, the public, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. All access through these existing areas must be coordinated in advance and in accordance with the Owner's usage and occupancy schedule.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 - c. Coordinate staging, parking and storage areas with the Construction Manager

and Owner.

- 6. Damages: Promptly repair damages caused to adjacent facilities by work of the Contract to a good-as-new condition acceptable to the Owner.
- 7. Schedule construction operations so as to minimize any conflicts or interruptions to the daily school functions. Coordinate any necessary interruptions with the designated project representative.
- 8. Existing Facilities: The following facilities are specifically noted as **not** to be used by Contractor or his employees:
 - a. Toilet facilities.
 - b. Food service facilities, including kitchen and dining areas.
 - c. Parking lots except for spaces specifically approved for use by the Construction Manager and Owner.
 - d. Telephones.
- B. Work Hours: All contract scopes of work in unoccupied areas of work can be performed weekdays from 7:00 AM to 3:30 PM unless otherwise noted. Work cannot be performed in occupied areas or adjacent to. Should work be required and coordinated, separation of work is mandatory per applicable codes/standards. When this is not feasible, work shall be scheduled off-hours, vacations and weekends for occupied areas. A Construction Manager Superintendent must be on site at all times that work is being performed. Second shift is considered after bus dismissal and coordinated for various after school clubs/activities/operations. For the purpose of the bid, the scopes of work below are assumed to be second, shift, weekends or off shift times and included with the Base Bid;
 - 1. Any activity requiring access to student-faculty occupied areas
 - 2. Any task/operation making disrupting noise (i.e., anything louder than a drill or saw)
 - 3. Any demolition operations
 - 4. All coring regardless of location or any anchoring to deck slab
- C. Deliveries: Deliveries to any area of the project will not be allowed between 7:30 am and 9:30 am, or 2:30 pm and 4:00 pm on school days. On Saturdays, school holidays and summer work periods, deliveries may be permitted during work hours with permission by the Owner and Construction Manager.
- D. Utility Shutdowns: Coordinate all utility shut downs and cross overs with the Owner, schedule during off hours and non-occupied times only.
- 1.11 ASBESTOS AND LEAD PAINT AWARENESS REQUIREMENTS
 - A. Contractor agrees not to use or permit the use of any asbestos containing material in or on any property belonging to the Owner.
 - B. For purposes of this requirement, asbestos free shall mean free from all forms of asbestos including actinolite, amosite, anthrophyhllite, chrysotile, cricidolite and tremolite both in friable and non-friable states and without regard to the purposes for which such material is used.
- 1.12 OCCUPANCY REQUIREMENTS

- A. The Contractor shall provide indoor air quality management as specified by the Department of Labor and OSHA for the building, when the building is enclosed, as determined by the Construction Manager.
 - 1. Provide an exhaust air system for the project indoor areas that could produce fumes, VOC's off-gasses, gasses, dusts, mists, or other emissions.
 - 2. Exhaust air system for the project areas that could produce emissions listed in Paragraph 1 shall be utilized.
 - 3. Provide temporary partitions and air seals to prevent the migration of airborne contaminants from unoccupied areas to occupied areas when applicable.

B. Quality assurance:

- Maintain a negative pressure between the work area and the space surrounding the
- 2. Before the start of work, submit a design for the exhaust air system. Do not begin work until approval of the Owner is obtained.
- 3. Location of the machines in the work space.
- 4. Description of the methods used to test air flow and pressure differential.

C. System operation:

- 1. A sufficient quantity of exhaust fans in existing window openings or other approved locations shall be operated in accordance with the following applicable standards.
- 2. The exhaust air system shall operate for a minimum of 72 hours after work is completed, or until all materials have cured sufficiently to stop out gassing of fumes or odors and the area has been ventilated to remove all detectable traces of odors and fumes.
- 3. Maintain twenty-five (25) feet clearance from all temporary exhaust outlets to all active building outdoor air intakes.

1.13 CONSTRUCTION TIME AND PHASING REQUIREMENTS

- A. The Contractor is advised the "time is of the essence" of the Contract as defined in Article 8 of the "Conditions". It is understood that the work is to be carried through to completion with the utmost speed consistent with good workmanship. Further, safe and legal ingress and egress shall be maintained at all times to and through the occupied portions of the construction site.
- B. If the contractor fails to maintain the progress as indicated by the milestone schedule by no other fault but its own and requires overtime to complete the work; the contractor shall make arrangements with the Construction Manager 24 hours in advance and pay for a Construction Manager's superintendent at \$125.00 per hour. In the event that the cause for delay is multi-contract, then the costs shall be distributed evenly among contracts. Advise the Construction Manager 48 hours prior to commencing work inside the building. Failure to progress the schedule in a fashion to maintain the overall completion date that causes other Contractors to "accelerate" is subject to back charges as determined by the Architect and Construction Manager. Contractor is to place CM and Prime on notice prior to any additional charges will be approved.
- C. All work and storage areas shall be completely enclosed by a fence or barricade at all times so that the public cannot approach the area or the equipment. The Contractor shall maintain fences and barricades at all times and shall -
 - Provide signs posted on fence 50 feet on center that read "Work Area Keep Out".
 - Maintain at all times, all exits and walkways from the Building.

Where the barricade is removed for work, the Contractor performing such work shall

provide adequate safety personnel to prevent unauthorized persons from approaching the work area.

- 1. The Contractor is advised that areas of the existing buildings which are to be added to and/or altered under this Contract will remain in use during construction, coordinate with Section 015000 for temporary facilities.
- Electrical and mechanical services to functioning spaces shall be maintained at all times. Swing-overs to new services shall be made so as to cause the least interruption to the facilities' operations. Limit utility shutdowns to two consecutive work days at no additional cost to the Owner unless prior agreement is made with the operating personnel of the facility.
- D. Work shall proceed in such a manner as to cause the least amount of disruption to the ongoing and surrounding operations as possible. All existing Owner-occupied areas of buildings (not turned over to the Project Contractors) need to remain operational at all times. The contractors are responsible for maintaining all systems, such as but not limited to fire alarms, clocks, electric, public address system, gas service, heat etc. The district intends to occupy all levels of the building throughout the construction duration. Coordination is required for all movements into the bldg., shutdowns, tie-ins and any other operational affecting operations/task.
- 1.14 PROOF OF ORDERS AND DELIVERY DATES Coordinate w/Section 013300 and 013200.
 - A. Within 2 weeks after the approval of shop drawings, samples, product data and the like, the Contractor shall provide copies of purchase orders for all equipment and materials which are not available in local stock. The Contractor shall submit written statements from suppliers confirming the orders and stating promised delivery dates.
 - B. This information shall be incorporated within the progress schedules so required as part of Sections 013300 and 013200 and shall be monitored so as to insure compliance with promised dates.
- 1.15 INTENT OF DOCUMENTS See Article 1, Subparagraph 1.2.1 of Section 007000 for resolution of conflicts between drawings and specifications. If, in the interpretation of Bid Documents, requirements within the Drawings and Specifications conflict, or it appears that the Drawings and Specifications are not in agreement, the Contractor shall base his bid on (1) the greater quantity, where there is a discrepancy in quantity; and (2) the superior quality, where there is a discrepancy in quality.

1.16 FIELD MEASUREMENTS

- A. The Contractor and respective sub-contractors shall take all necessary field measurements prior to fabrication and installation of work and shall assume complete responsibility for accuracy of same.
- B. This project is an INTERIOR ALTERATION and therefore necessitates additional attention to existing conditions receiving newly fabricated and installed equipment, i.e. note the requirements for field dimensioning of shop fabricated items whether or not so required by each technical section.

1.17 INITIAL SUBMITTAL REQUIREMENTS

A. As outlined in Sections 005000, 007000, 013300, 013200, 015000 and 015719 Contractor shall provide items noted including - bonds, insurance, emergency telephone numbers, progress scheduling, schedules of submittals, subcontractor listings, and the like prior to the start of any work.

- B. Schedule of Values
 - 1. Submit schedule on AIA Form G703.
 - Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement or as established in Notice to Proceed, whichever is earliest.

1.18 QUALITY REQUIREMENTS

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturer's instructions.
- C. Comply with specified standards as minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- D. Monitor fabrication and installation tolerance control of installed Products over suppliers, manufacturers, Products, site conditions, and workmanship, to produce acceptable Work. Do not permit tolerances to accumulate.
- E. Comply fully with manufacturer's tolerances.

1.19 WASTE MANAGEMENT PROCEDURES AND DEFINITIONS

- A. Waste Management Coordination: Coordinate recycling of materials with Owner and as required to conform to the Construction Waste Management Plan defined in Section 017419.
- B. Contractor shall conduct Construction Waste Management meetings as outlined in Section 013119 Project Meetings. At a minimum, waste management goals and issues shall be discussed at the following meetings:
 - 1. Pre-construction meeting.
 - 2. Regular job-site meetings.
 - 3. Job safety meetings.
- C. Use on-site waste as primers, sealers, underlayment, supports, backing, blocking, furring, suspension systems, and accessories as required for any purpose in patching work damaged as a result of construction activities.
- D. Waste Management Definitions
 - 1. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
 - Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
 - 3. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitability, corrosivity, toxicity or reactivity.
 - 4. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitability, corrosivity, toxicity, or reactivity.
 - 5. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
 - 6. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
 - 7. Recycle: To remove a waste material from the Project site to another site for remanufacture into a new product for reuse by others.
 - 8. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form.

- Recycling does not include burning, incinerating, or thermally destroying waste.
- 9. Return: To give back reusable items or unused products to vendors for credit.
- 10. Reuse: To reuse a construction waste material in some manner on the Project site.
- 11. Salvage: To remove a waste material from the Project site to another site for resale or reuse by others.
- 12. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- 13. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- 14. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- 15. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- 16. Volatile Organic Compounds (VOCs): Chemical compounds common in and emitted by many building products over time through outgassing including solvents in paints and other coatings; wood preservatives; strippers and household cleaners; adhesives in particleboard, fiberboard, and some plywoods; and foam insulation.
- 17. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.
- 18. Waste Management Plan: A Project-related plan for the collection, transportation, and disposal of the waste generated at the construction site. The purpose of the plan is to ultimately reduce the amount of material being landfilled.

1.20 OWNER OCCUPANCY REQUIREMENTS

- A. Full Owner Occupancy: Owner will occupy the existing building and surrounding site during the entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations.
- B. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
 - 1. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
 - 2. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will provide, operate, and maintain mechanical and electrical systems serving occupied portions of building.
 - 3. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.
- C. Comply with standards for construction projects as follows:
 - 1. Interaction with students, employees and visitors is strictly forbidden.

- 2. Use of offensive or inappropriate language is strictly forbidden .
- 3. The use of radios, tape and CD players is prohibited on the site and in the buildings.
- 4. Smoking and vaping is prohibited on the site and in the buildings.
- 1.21 REGULATIONS OF THE COMMISSIONER OF EDUCATION 8 NYCRR 155.5 UNIFORM SAFETY STANDARDS FOR SCHOOL CONSTRUCTION AND MAINTENANCE PROJECTS
 - A. This Article indicates requirements for school construction and maintenance projects required under New York Codes Rules and Regulations, Regulations of the Commissioner of Education, Part 155, Section 155.5, and are binding on all Contracts of this Project.
 - B. The occupied portion of the school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy.
 - C. Comply with general safety and security standards for construction projects as follows:
 - 1. Store all construction materials in a safe and secure manner.
 - 2. Provide and maintain fences around construction supplies or debris.
 - 3. Maintain all gates locked at all times when school is in session, unless a worker is in attendance to prevent unauthorized entry.
 - 4. Provide overhead protection during exterior renovation work, for any sidewalks or areas immediately beneath the work site, or fence off such areas and provide with warning signs to prevent entry.
 - 5. Provide all workers with photo-identification badges that are required to be worn at all times for identification and security purposes while working at the project site.
 - D. Separation of Construction Areas from Occupied Spaces: Separate construction areas which are under the control of a contractor and therefore not occupied by district staff or students from occupied areas. Provide dust proof partitions to prevent dust and contaminants into occupied parts of the building. Provide periodic inspection and repairs of the containment barriers 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. Workers may not use corridors, stairs or elevators designated for students or school staff.
 - Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. No movement of debris through halls of occupied spaces of the building is permitted. No material shall be dropped or thrown outside the walls of the building.
 - 3. Clean all occupied parts of the building affected by renovation activity at the close of each workday. Maintain required health, safety and educational capabilities at all times for school buildings occupied during a construction project when classes are in session.
 - E. Exiting: Maintain all building exits during construction. Comply with exiting plans incorporated in the Construction Documents. If exiting is modified other than as shown on the Contract Documents, provide a plan for Architect's review detailing how exiting

required by the applicable building code will be maintained during construction. The plan shall indicate temporary construction required to isolate construction equipment, materials, people, dust, fumes, odors, and noise during the construction period. Temporary construction details shall meet code-required fire ratings for separation and corridor enclosure. At a minimum, required exits, temporary stairs, ramps, exit signs, and door hardware shall be provided at all times.

- F. Ventilation: Comply with the ventilation plan incorporated in the Construction Documents. The plan shall indicate ductwork which must be rerouted, disconnected, or capped in order to prevent contaminants from the construction area from entering the occupied areas of the building. The plan shall also indicate how required ventilation to occupied spaces affected by construction will be maintained during the project.
- G. Fire and Hazard Prevention: Areas of buildings under construction that are to remain occupied shall maintain a certificate of occupancy. In addition, the following shall be strictly enforced:
 - 1. No smoking is allowed on public school property, including construction areas.
 - 2. During construction daily inspections of district occupied areas shall be conducted by the Contractor's personnel to assure that construction materials, equipment or debris do not block fire exits or emergency egress windows.
 - 3. Proper operation of fire extinguishers, fire alarm, and smoke/fire detection systems shall be maintained throughout the project.
- H. Noise Abatement During Construction Activities: Contain noise from construction operations so as to not produce noise in excess of 60 dba in occupied spaces when school is in session, or schedule work for times when the building or affected building spaces are not occupied (school is not in session), or provide acoustical abatement measures to reduce noise to acceptable levels.
 - 1. Noise level measurements (dba) shall be taken with a type 2 sound level meter in the occupied space in a location closest to the source of the noise.
- I. Control of Chemical Fumes, Gases, and Other Contaminants during Construction and Maintenance Projects: Control exhaust fumes from welding, gasoline engines, roofing, paving, painting, VOC fumes, or other fumes to assure they do not enter occupied portions of the building or fresh air intakes.
 - Schedule, cure or ventilate materials and activities to allow for "off-gassing" of volatile organic compounds introduced during construction before occupancy of school. Specific attention is warranted for materials and activities including, but not limited to, glues, paint, furniture, carpeting, wall coverings, and drapery.
 - a. Air out building materials or furnishings which "off-gas" chemical fumes, gases, or other contaminants in one of the following manners:
 - 1) Air out in a well-ventilated heated warehouse before they are brought to the project for installation.
 - 2) Air out installed products in accordance with the manufacturer's recommended "off-gassing" periods by allowing this period of time to

elapse prior to Substantial Completion date.

- b. If the work will generate toxic gases that cannot be contained in an isolated area, the work must be done when school classes and programs are not in session. The building must be properly ventilated and the material must be given proper time to cure or "off-gas" before re-occupancy.
- 2. Manufacturer's Material Safety Data Sheets (MSDS) shall be maintained at the site for all products used in the project. MSDS must be provided to anyone who requests them.
- J. Large and small asbestos abatement projects as defined by 12NYCRR56 shall not be performed while the building is occupied. Note, It is The State Education Department's interpretation that the term "building", as referenced 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 noncombustible 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 at windows is provided. Care must be taken to schedule work so that classes are not disrupted by noise or visual distraction.
- K. Lead-Based Paint Sampling and Analysis Notification: Surfaces containing lead will not be disturbed during construction.

1.22 PAYROLLS AND PAYROLL RECORDS

- A. In accordance with Article 8, Section 220 of the New York State Labor Law, every contractor and subcontractor must keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. Payrolls must be maintained for at least three years from the project's date of completion. At a minimum, payrolls must show the following information for each person employed on a public work project:
 - 1. Name
 - 2. Classification(s) in which the worker was employed
 - 3. Hourly wage rate(s) paid
 - 4. Supplements paid or provided
 - 5. Daily and weekly number of hours worked in each classification.
- B. Every contractor and subcontractor shall submit, within thirty (30) days after issuance of it's first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury.

1.23 PROJECT MILESTONE SCHEDULE

See the milestone schedule provided with the Documents.

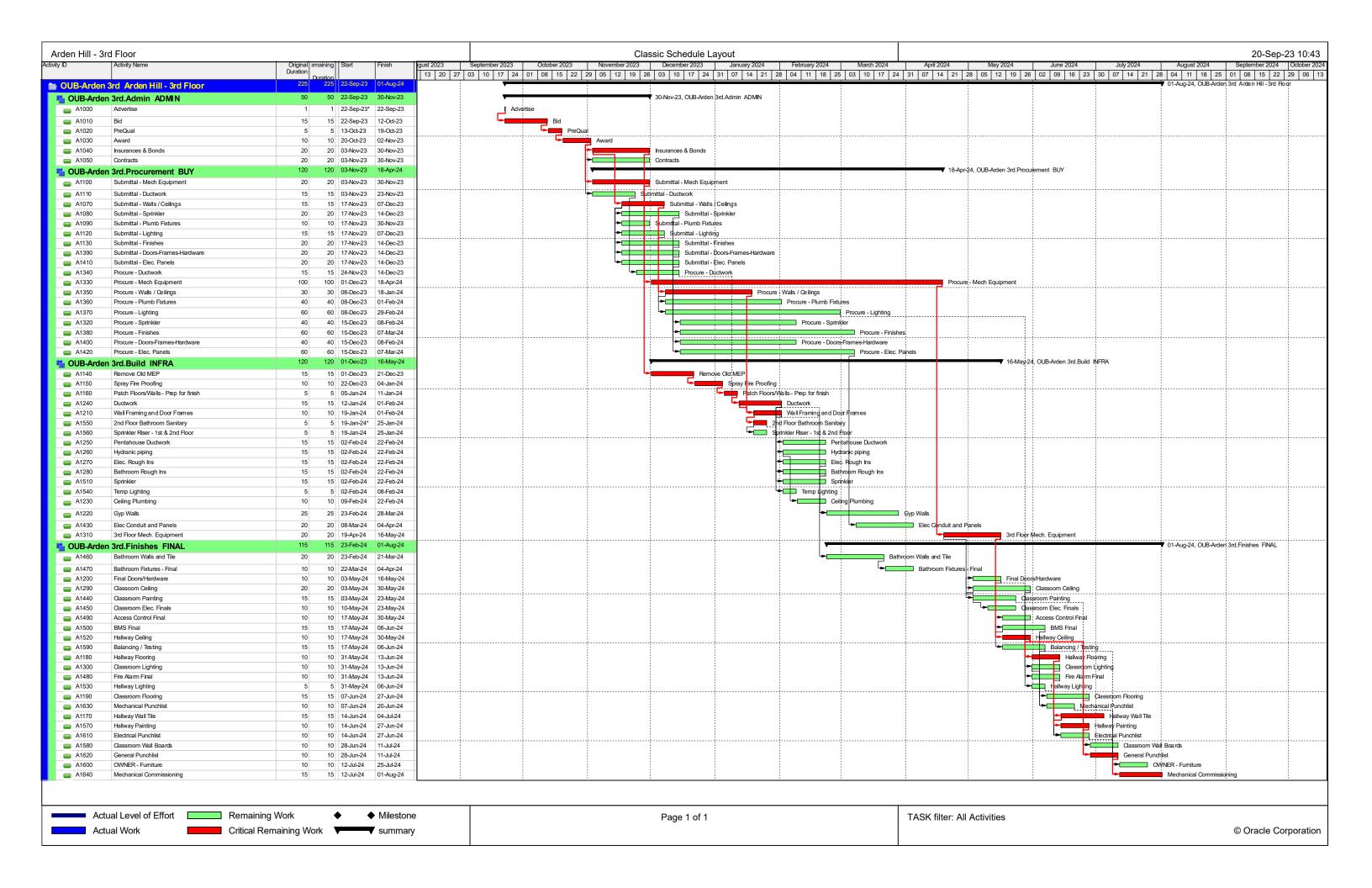
22 September 2023 44-90-00-00-8-035-008 Bid Issue Orange-Ulster BOCES Interior Alterations – Third Floor Regional Education Center at Arden Hill

The Contractor is required to submit a schedule based on the milestone dates to the Construction Manager for review and comment no later than 10 days after a Notice to Proceed for the work is issued.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION - Attachment: Project Milestone Schedule



SECTION 011501 - SPECIAL PROJECT REQUIREMENTS

Excerpts from 8 NYCRR Section 155.5 as they address "General Safety and Security Standards for Construction Projects".

STATEMENT OF PURPOSE: "The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy"

1.1 GENERAL

- A. Requirements set forth herein are in addition to and shall be considered as complementary to the General Conditions and the balance of Division #1 and Technical Specifications.
- B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.
- C. All contractors, subcontractors, Sub-subcontractors, vendors and the like shall monitor their workers and require that they adhere to the following safety provisions during all construction and maintenance activities for the duration of the project.

1.2 REQUIREMENTS INCLUDED

- A. Safe and Secure Storage of Construction Materials
- B. Fencing Project; Material storage areas; Container/Refuse areas
- C. Gates Manned during working hours; locked and secure off hours.
- D. Sidewalk bridges, security barriers, etc. reference "Exterior Renovations"
- E. Worker identification system
- F. Temporary partitions separation of construction areas from occupied spaces; construction, materials, inspection and maintenance
- G. Worker access both horizontal and vertical in occupied buildings
- H. Debris removal.
- I. Ventilation of workspaces
- J. Exiting
- K. Fire and hazard prevention
- L. No Smoking
- M. Fire extinguishers
- N. Temporary sprinklers (if any)
- O. Smoke detectors (temporary)
- P. Fire watch and maintenance of existing fire alarm systems
- Q. Storage of gas and welding equipment
- R. Noise abatement procedures
- S. Construction fume controls
- T. Off-Gassing/bake out procedures
- U. Manufacturer's Material Safety Data Sheet log
- V. Asbestos Code Rule 56
- W. Asbestos TEM
- X. Lead Abatement/Lead paint

- 1.3 SAFE AND SECURE STORAGE OF CONSTRUCTION MATERIALS Coordinate with Sections 01 50 00 and 01 61 00 each as included with these documents.
 - A. Upon written approval from the Owner materials stored on the Site shall be neatly arranged and protected and shall be stored in an orderly fashion in locations that shall not interfere with the progress of the Work.

<u>NOTE</u> - If approval is given to store materials in any part of the building area, they shall be so stored as to cause no overloading of the structure.

- 1.4 FENCING PROJECT; MATERIAL STORAGE AREAS; CONTAINER/REFUSE AREAS Coordinate with Section 01 50 00
 - A. Barrier fencing constructed as outlined in Section 01 50 00 shall be provided surrounding all work areas, material storage locations and around dumpsters and/or chutes when involved with demolition/removal operations.
 - B. Fencing shall be maintained in good sound condition throughout the entire course of construction by the Contractor and removed only when directed by the Architect.

1.5 GATES

- A. Gates in construction fencing shall be of construction outlined in Section 01 50 00 and shall be under the Contractors' supervision throughout the workday and shall be secured in a locked condition at the close of any single business day and on all non-workdays. Gates shall be manned at all times work is in progress.
- 1.6 SIDEWALK BRIDGES, SECURITY BARRIERS, ETC. REFERENCE "EXTERIOR RENOVATIONS"
 - A. As applicable to the project involved, provide overhead protective devices for the work consisting of tubular framed scaffold bridges, joist trusses and solid decking. Provide guard rails, lights and warning signs.
- 1.7 WORKER IDENTIFICATION SYSTEM Coordinate with Section 01 10 00, Article 1.01.
 - A. All Contractors' employees shall use a single means of access and egress, except in the case of emergency, to be designated by the Contractor.
 - B. The Contractor shall, for all work covered under the Contract, establish a security control system for personnel and material involved with the work herein.
 - C. The control system shall include photo identification badges and the like so as to insure against unauthorized entry to the site and resultant entry to the building proper.
- 1.8 TEMPORARY PARTITIONS SEPARATION OF CONSTRUCTION AREAS FROM OCCUPIED SPACES; CONSTRUCTION, MATERIALS, INSPECTION AND MAINTENANCE Coordinate with Section 01 50 00.
 - A. Provide temporary partitions from floors to underside of structure above, in sash and any other openings created by new construction, additions and alterations.
 - B. Such partitions shall be constructed dust-tight using steel studs and acoustically and/or thermally insulated, Level 1 taped fire rated gypsum.
 - C. Locate enclosures as directed by the Architect and/or as shown on the drawings.

- D. In addition to partitions and closures, provide tight fitting filters over all return air grilles and/or open ducts in order to properly protect central air handling equipment.
- E. <u>Take all necessary precautions to avoid unnecessary dust spreading</u> to adjoining rooms and spaces.
- F. Keep all doors to spaces closed and provide positive seals around cracks, frames, doors and other openings within work areas.
- G. WHERE EXTERIOR CLOSURES ARE REQUIRED, INSULATE SAME TO MAINTAIN A TEMPERATURE OF SIXTY-FIVE (65) DEGREES F. WITHIN THE PLANT WITHOUT THE USE OF SPECIAL HEATING EQUIPMENT.
- H. All temporary enclosures/partitions/containment barriers shall be periodically inspected and maintained in good repair so as to prevent exposure to dust and contaminants outside the work and/or containment areas.

1.9 WORKER ACCESS BOTH HORIZONTAL AND VERTICAL IN OCCUPIED BUILDINGS

- A. A specific stairwell and/or elevator shall be assigned for construction worker use during work hours. Workers may not use corridors, stairs or elevators designated for students or school staff.
- 1.10 DEBRIS REMOVAL Coordinate with Sections 01 50 00, 01 77 00 and 02 41 20 as applicable to Project.
 - A. Large amounts of debris must be removed by use of enclosed chutes or similar systems. There shall be no movement of debris through corridors of occupied spaces of the building. No materials shall be dropped or thrown outside the walls of the building.
 - B. All occupied parts of the building or buildings affected by renovation activity shall be cleaned at the close of each workday.
 - C. School buildings occupied during any construction period shall maintain required health, safety and educational capabilities at all times that classes are in session.

1.11 VENTILATION OF WORKSPACES - SEE SECTIONS 02 82/83 00

1.12 EXITING

A. At all times, the Contractor is responsible for maintenance of safety and egress requirements from work areas.

NOTE: All legal forms of egress must be maintained at all times.

- B. Provide temporary exit passage system(s) with guard and handrails and ramps and such other measures indicated on the drawings and as applicable to the particular project.
- 1.13 FIRE AND HAZARD PREVENTION See Section 01 50 00 for requirements for fire watches, storage and maintenance of welding gasses and temporary heating and the like.
- 1.14 NO SMOKING No smoking is permitted on the grounds or within the construction area of any project.

- 1.15 FIRE EXTINGUISHERS Fire extinguishers shall be provided within the work area and shall be monitored on a scheduled maintenance basis and so tagged to indicate same.
- 1.16 TEMPORARY SPRINKLERS (IF ANY) See Section 01 50 00 for applicable text and requirements.
- 1.17 SMOKE DETECTORS The respective prime contractor shall provide a temporary battery powered smoke detection system for all areas under construction.
- 1.18 FIRE WATCH AND MAINTENANCE OF EXISTING FIRE ALARM SYSTEMS See Section 01 50 00
 - A. All Contractors shall comply with the safety provisions of the National Fire Protection Association's "National Fire Codes" pertaining to the work and, particularly, in connection with any cutting or welding performed as part of the work.
 - B. During welding or cutting operations, a contractor's man shall act as a fire watcher. The fire watcher shall have proper eye protection and suitable firef ighting equipment including fire extinguisher (bearing current inspection Certificate), protective gloves and any other equipment deemed necessary.
 - C. The Respective Prime Contractor will provide for and maintain the proper operation of fire alarm and smoke detection systems in all areas throughout the course of the project. The Respective Prime Contractor will provide all labor and material required to accomplish this in occupied areas of the school buildings and in areas under construction.
- 1.19 STORAGE OF GAS AND WELDING EQUIPMENT See Section 01 50 00 for specific requirements and controls.

1.20 NOISE ABATEMENT PROCEDURES

- A. Develop and maintain a noise abatement program and enforce strict discipline over all personnel to keep noise to a minimum. Equipment and work shall not produce noise in excess of 60db in occupied areas or shall be scheduled for off hours or acoustical abatement procedures shall be taken. Noise level measurements (dba) shall be taken with a type 2 sound level meter in the occupied space in a location closest to the source of the noise.
- B. Execute construction work by methods and by use of equipment which will reduce excess noise.
- C. Equip air compressors with silencers, and power equipment with mufflers.
- D. As established in Section 01 10 00, all contractors shall abide by the "no work" periods designated by the Owner.
- 1.21 CONSTRUCTION FUME CONTROLS See Article 1.11 herein.
- 1.22 OFF-GASSING/BAKE OUT PROCEDURES Not Required
- 1.23 MATERIAL SAFETY DATA SHEET LOG Coordinate with Section 01 33 00
 - A. Contractor shall maintain "MSDS" file on site, accessible to workers and Uniform Safety Standards

otherwise in compliance with jurisdiction's "Right To Know" legislation.

NOTE: The submittal of the required MSDS information shall be segregated from the required material/shop drawing/sample submittals in a separate binder and not co-mingled with the technical submittals, failure to so conform will be cause for rejection of any submittal.

1.24 ASBESTOS CODE RULE 56 AND ASBESTOS CONTAMINATED MATERIALS (ACM)

- A. Abatement projects as defined by Rule 56 shall not be performed while the building is occupied.
- B. In the event asbestos-contaminated materials are encountered during the work Contractor shall immediately notify the Architect and/or Owner for instructions as to procedures to be taken.
- C. All asbestos abatement projects shall comply with all applicable federal and State laws including but not limited to the New York State Department of Labor industrial code rule 56(12 NYCRR 56), and the federal Asbestos Hazard Emergency Response Act (AHERA), 40 CFR Part 763 (Code of Federal Regulations, 1998 Edition, Superintendent of Public Documents, Government Printing Office, Washington, DC 20402; 1998; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, New York 12234). Large and small asbestos projects as defined by 12 NYCRR 56 shall not be performed while the building is occupied. Minor asbestos projects defined by 12 NYCRR 56 as an asbestos project involving the removal, disturbance, repair, encapsulation, enclosure or handling of 10 square feet or less of asbestos or asbestos material, or 25 linear feet or less of asbestos or asbestos material may be performed in unoccupied areas of an occupied building in accordance with the above referenced regulations.

1.25 LEAD ABATEMENT/LEAD PAINT

- A. In the event lead based paint is encountered during the work Contractor shall immediately notify the Architect and/or Owner for instructions as to procedures to be taken.
- B. Attention is directed to technical Section 02 83 00 for "protocols" concerning lead paint removals and preparation.
- C. Any construction or maintenance operations which will disturb lead based paint shall be abated pursuant to protocols detailed in the "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing" (June 1995; U.S. Department of Housing and Urban Development, Washington, DC 20410; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234). All areas scheduled for construction as well as areas of flaking and peeling paint shall be tested for the presence of lead and abated or encapsulated in accordance with the above noted guidelines

End of Section

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Submit the Schedule of Values to Construction Manager at pre-construction conference.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. SED number.
 - e. Contractor's name and address.
 - f. 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 the 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 the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
- Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. No line item should exceed 10% of the contract sum.
- 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
- 5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
- 6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
- 7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
- 8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and Construction Manager and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Failure to proceed with coordination drawings or complete and submit HVAC balancing reports will delay payment applications.
- C. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- D. Payment Application Forms: Use AIA Document G732 CMA and AIA Document G703 Continuation Sheets as form for Applications for Payment.

- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - 3. Payrolls and Payroll Records:
 - a. In accordance with Article 8, Section 220 of the New York State Labor Law, every contractor and subcontractor must keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. Payrolls must be maintained for at least three years from the project's date of completion. At a minimum, payrolls must show the following information for each person employed on a public work project:
 - 1) Name
 - 2) Classification(s) in which the worker was employed
 - 3) Hourly wage rate(s) paid
 - 4) Supplements paid or provided
 - 5) Daily and weekly number of hours worked in each classification.
 - b. Every contractor and subcontractor shall submit, within thirty (30) days after issuance of it's first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury.
 - 4. Attachments to Applications for Payment: In addition to other requirements stated in the Contract Documents, include with each Application for Payment fully executed Partial Release and Waiver of Liens on the form included at the end of this Section. In addition provide a current copy of the approved Contractor's Construction Schedule, signed by all Prime Contractors, indicating agreement to the schedule.
- F. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Construction Manager by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and all other required attachments.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

- 1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.
- 2. When an application shows completion of an item, submit final or full waivers.
- 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
- 4. Waiver Delays: Submit each Application for Payment with Contractor's waiver of mechanic's lien for construction period covered by the application.
 - a. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
- 5. Waiver Forms: Submit partial waivers of lien on form included at the end of this Section, executed in a manner acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals (that have been previously approved) that must precede or coincide with submittal of first Application for Payment include the following:
 - 1. List of Subcontractors.
 - 2. Schedule of Values.
 - 3. Contractor's Construction Schedule.
 - 4. Products list.
 - 5. Submittals Schedule.
 - 6. List of Contractor's staff assignments.
 - 7. List of Contractor's principal consultants.
 - 8. Copies of building permits.
 - 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 - 10. Initial progress report.
 - 11. Report of preconstruction conference.
 - 12. Certificates of insurance and insurance policies.
 - 13. Performance and payment bonds.
 - 14. Data needed to acquire Owner's insurance.
 - 15. Initial settlement survey and damage report if required.
- I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
 - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum. Submit the following prior to Application for Payment:

- a. All Project Record Documents (record drawings, etc.) as indicated in Division
 01 Section "Closeout Procedures."
- b. Balance reports for mechanical and electrical systems.
- 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
 - 1. Evidence of completion of Project closeout requirements.
 - 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 - 3. Updated final statement, accounting for final changes to the Contract Sum.
 - 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 - 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 - 6. AIA Document G707, "Consent of Surety to Final Payment."
 - 7. Evidence that claims have been settled.
 - 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

Attachment: Partial Waiver of Liens Form

REQUISITION FOR PARTIAL PAYMENT - WAIVER OF LIENS

PROJECT	OWNER			
GENERAL CONTRACTOR	SUBCONTRACTOR/VENDOR			
CONTRACT	WORK COMPLETE			
PROJECT:	CONTRACT -\$			
TRADE:	CHANGE ORDERS -\$			
CONTRACT -\$	TOTAL COMPLETE -\$			
CHANGE ORDERS -\$	RETAINAGE (%) -\$			
TOTAL CONTRACT -\$	LESS PRE. REQ\$			
	THIS REQUISITION -\$			

Waiver of Lien

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

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

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

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

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

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

WITNESS:	FIRM:	
D)/	DATE	
RY·	DATE	

CORPORATE ACKNOWLEDGEMENT State of
)SS.
County of
On the day of, before me came to me known and who by me being duly sworn did depose and say that he resides at that he is the officer of the said corporation
executing the foregoing instrument, that he knows the seal of said corporation, that the seal affixed to said instrument is such corporate seal, that it was so affixed by order of the Board of Directors of said corporation and that he signed his name thereto by like order.
Notary Public
INDIVIDUAL ACKNOWLEDGEMENT State of
)SS.
County of
On the day of, before me came to me known and who by me being duly sworn did depose and say that he resides at that he is the individual
who executed the foregoing instrument.
Notary Public
PARTNERSHIP ACKNOWLEDGEMENT State of
)SS.
County of
On the day of, before me came to me known and who by me being duly sworn did depose and say that
he resides at; that he is the partner in the firm of doing business under the name of and that he executed the foregoing instrument on
behalf of said partnership.
Notary Public

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Conservation.
 - 3. Administrative and supervisory personnel.
 - 4. Project meetings.
 - 5. RFI's.

1.2 COORDINATION

- A. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Architect, Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's Construction Schedule.
 - 2. Preparation of the Schedule of Values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.

- 6. Preinstallation conferences.
- 7. Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work.
- E. Use of the Site: The Construction Manager will administer allocation of available space equitably among separate Contractors and other entities needing access and space, so as to produce the best overall efficiency in performance of the total work of the project. Each contractor shall schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.

1.3 SUBMITTALS

- A. Staff Names: Within 5 days of Notice to Proceed, Contractor shall submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 - 1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone.
- B. Company Safety Plan: Submit safety program including MSDS Management Plan for the Work of this Project.

1.4 REQUESTS FOR INFORMATION (RFI's)

- A. General: All requests for information or clarification shall be forwarded to the Architect. Contractor shall maintain a log of the status of each request shall be prepared to discuss outstanding items at each progress meeting.
- B. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
 - 1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- C. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

- 1. Project name.
- 2. Date.
- Name of Contractor.
- 4. Name of Architect
- 5. Names of Trade/Specialty Contractors affected and coordinated with.
- 6. RFI number, numbered sequentially.
- 7. Specification Section number and title and related paragraphs, as appropriate.
- 8. Drawing number and detail references, as appropriate.
- 9. Field dimensions and conditions, as appropriate.
- 10. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
- 11. Contractor's signature.
- Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- D. Hard-Copy RFIs; Prepare on the RFI Submittal Form included at the end of this Section.
 - 1. Identify each page of attachments with the RFI number and sequential page number.
- E. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
 - 1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- F. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow five working days minimum for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
 - 1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
 - 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be processed under "Changes to the Work" provisions in the General Conditions.

- a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response, unless otherwise established in the General Conditions.
- G. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
- H. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bi-weekly. Include the following:
 - 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect
 - 4. RFI number including RFIs that were dropped and not submitted.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Architect's response was received.
 - 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project Superintendent, Contractor shall provide other administrative and supervisory personnel as required for proper performance of the Work
 - 1. Administrative and/or supervisory personnel shall always be present on the job site when work is being performed; this person shall be familiar with Project and authorized to conclude matters relating to progress.
 - 2. Include special personnel required for coordination of operations with other contractors.

1.6 PROJECT MEETINGS

- A. General: Construction Manager will schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Construction Manager will inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Construction Manager will notify Owner of scheduled meeting dates and times.
 - 2. Agenda: Construction Manager will prepare the meeting agenda and distribute the agenda to all invited attendees.
 - 3. Minutes: Construction Manager will record significant discussions and agreements achieved at all other meetings and will distribute the meeting minutes to everyone concerned, including Owner and Architect, within 3 days of the meeting.
- B. Preconstruction Conference: Construction Manager will schedule a preconstruction conference before starting construction, at a time convenient to Owner, and Architect,

but no later than 15 days after execution of the Agreement. Conference will be held at Project site or another convenient location. Construction Manager will conduct the meeting to review responsibilities and personnel assignments.

- 1. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; 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 Project and authorized to conclude matters relating to the Work.
- 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing.
 - d. Designation of responsible personnel.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for processing Applications for Payment.
 - g. Distribution of the Contract Documents.
 - h. Submittal procedures.
 - i. Preparation of Record Documents.
 - j. Use of the premises.
 - k. Responsibility for temporary facilities and controls.
 - I. Parking availability.
 - m. Office, work, and storage areas.
 - n. Equipment deliveries and priorities.
 - o. First aid.
 - p. Security.
 - q. Progress cleaning.
 - r. Working hours.
- 3. Contractor shall submit the following items at this meeting:
 - a. Preliminary Contractor's Construction Schedule (if schedule has not yet been submitted).
 - b. List of Subcontractors.
 - c. Schedule of Values.
 - d. Submittal Schedule.
 - e. Products List (Proposed products and manufacturers including any substitution products proposed).
- C. Preinstallation Conferences: When required in the individual Specification Section, conduct a Preinstallation conference at Project site before each construction activity that requires coordination with other construction.
 - 1. Attendees: Installer and representatives of 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 Architect of scheduled meeting dates in advance.

- 2. Contractor shall prepare agenda, preside at conference, record minutes, and distribute copies after conference to participants. Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Submittals.
 - g. Review of mockups.
 - h. Possible conflicts.
 - i. Compatibility problems.
 - j. Time schedules.
 - k. Weather limitations.
 - I. Manufacturer's written recommendations.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities and controls.
 - g. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Testing and inspecting requirements.
 - t. Required performance results.
 - u. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements.
- 4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Construction Manager will conduct progress meetings at weekly intervals, or as needed in the temporary field office at the Project site.
 - 1. Construction Manager will preside over these meetings.
 - 2. Attendees: In addition to representatives of Owner, Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - a. A representative of Contractor shall be present at every progress meeting, regardless of whether or not that Contractor is performing work at the site at the time.
 - b. Any decision reached at a job meeting shall be binding on a Contractor, whether or not he or his representative is present at such job meeting.

- 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
 - 14) Documentation of information for payment requests.
- 4. Reporting: Construction Manager will distribute minutes of the meeting to each party present and to parties who should have been present and will include a brief summary, in narrative form, of progress since the previous meeting and report.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- E. Coordination Meetings: Construction Manager will conduct Project coordination meetings at intervals required by the Construction Documents. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
 - 1. Attendees: Each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work
 - 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

- 3. Any decision reached at a job meeting shall be binding on a Contractor, whether or not he or his representative is present at such job meeting
- 4. Reporting: Construction Manager will record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

ATTACHMENTS: RFI SUBMITTAL FORM

Orange-Ulster BOCES Interior Alterations – Third Floor Regional Education Center at Arden Hill

REQUEST FOR INFORMATION (RFI FORMAT)

Contractor:		Architect: KG&D Architects, PC			
Address:		Address: 285 Main Street, Mt. Kisco, NY 10549			
Telephone:		Telephone: 914-666-5900			
Fax:		Fax: 914-66			
Email:		Email: Bman	gan@kgdarchitects.com		
Project Name:		Project Location:			
RFI Number:	Date of Request:	Requested Date of Response (5 business days minimum- Close date Feb 26, 2021):			
Description, complete with ba	ackup data as necessary atta	ched hereto:			
Sketches of Conditions	Specification Paragraph	1	Drawing Reference(s):		
	Reference(s):				
Proposed Solution:			<u> </u>		
Tropodou Goldaon.					
Cost Impact:		Time Impact:			
T 1.10 1.11 0 1					
Trade/Specialty Contractors	Affected:				
Trade/Specialty Contractors	Coordinated With:				
Trade/opecially Contractors	Coordinated With.				
Submitted By:					
,					
Architect's Response:					
Dv.		Data of Passansa:			
Ву:		Date of Response:			
		1			

SECTION 013115 - COORDINATION DRAWINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes preparation of coordination drawings for architectural, structural, mechanical, plumbing, fire protection, fire alarm, lighting, information technology, security, and electrical Work.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for administrative provisions for coordinating construction operations.
 - 2. Division 01 Section "Closeout Procedures" for project record drawing requirements.
 - 3. Division 21, 22, 23, 26, 27 and 28 for additional requirements.

1.2 DEFINITION AND INTENT

- A. The Contract Drawings (mechanical, plumbing, and electrical plans) are diagrammatic only and are not intended to show the alignment, exact physical locations, or configurations of such Work. Performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results. Where possible, 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 coordination drawings.
- B. Coordination drawings are drawings prepared by Contractor that superimpose Work of multiple trades involved in the construction process. Coordination drawings indicate systems and components to be installed by the Contractor to maximize clear height and free area in ceiling cavities, allow for proper and adequate equipment service clearances, minimize space required by shafts and chases and provide the most efficient functioning and use of materials possible while complying with the final performance and finished appearance required by the Contract Documents.
- C. Coordination drawings are intended to show the relationship and integration of different construction elements that require coordination during fabrication or installation to fit in the space provided, to function as intended, and to present the intended final finished appearance.
- D. Coordination Drawings are not a replacement for shop drawings specified in the technical specifications or the Record Drawings required in Division 01.
- E. The Contractor shall manage the process so that each trade/ sub contractor provides all required information in a timely manner. Coordination Drawings may be completed on a phased basis so as not to delay the overall project schedule. The CPM Schedule

specified elsewhere in Division 01 Section "Construction Progress Documentation" shall include the submission of Coordination Drawings. The same shall demonstrate how the Contractor intends to integrate the submission of Coordination Drawings to suit the overall project schedule. The Contractor shall pay all costs for reproducing copies of coordination drawings for use in the field.

F. Contractor shall maintain equipment access and pathways as indicated on the Drawings. Floor space in equipment rooms shall be maintained as indicated on the Drawings. Contractor shall clearly indicate access and floor space to be maintained in coordinated shop drawings submitted to the Owner and Architect as per the Specifications

1.3 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

A. Refer to Division 01 Section "Submittal Procedures" for availability of and use of Architect's CAD Background Drawings.

1.4 SUBMITTALS

- A. Coordination Drawings: Prepare and submit as informational submittal within 15 days of Notice to Proceed.
- B. Submit coordination drawings in the same manner as shop drawings; refer to Section 013300 Submittal Procedures.

1.5 PROJECT CONDITIONS

- A. Maintain marked up set of coordination drawings at Project site available for reference by Owner and Architect.
- B. Maintain original CAD drawings or base drawings used to produce coordination drawings updated with revisions to reflect actual construction. Make drawing revisions at time of change to construction; Transfer information to CAD drawings no later than every 7 days.
- C. Failure to submit coordination drawings will result in no changes to contract sum for necessary corrections to uncoordinated work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION OF COORDINATION DRAWINGS, GENERAL

A. Prepare coordination drawings for Project using CAD drawings or similar coordination documentation overlay drawings indicating coordination of the project.

- B. CAD Drawings: Produce coordination drawings and overlays using Architect's electronic base drawings furnished by the Architect.
 - 1. Each trade shall be assigned a layer to create the detailing work of each section or division of the Specifications requiring coordination. The Contractor shall ensure that the layer assigned to one trade cannot be modified by another trade, and that the final product clearly differentiates which trade is responsible for the respective information shown. The latter may occur through the use of colors or other distinct graphic methods.

3.2 INFORMATION REQUIRED IN COORDINATION DRAWINGS

- A. Architectural Work Information Required in Coordination Drawings:
 - 1. Items which are recessed into ceilings and ceiling plenums, or surface mounted to ceilings.
 - 2. Anchorages, fastenings, and supporting for items recessed in, attached to, or suspended from ceilings or structure above ceilings.
 - 3. Firewalls, Fire Barrier, Fire partitions and smoke partitions on coordination drawings for coordination of life safety requirements.
- B. Plumbing Work Information Required in Coordination Drawings:
 - 1. Sizes and bottom elevations of piping with insulation thickness included.
 - 2. Dimensions of major components, such valves, access doors and cleanouts.
 - 3. Fire-rated enclosures around piping
 - 4. Support of all roof mounted plumbing piping and equipment.
 - 5. Required space to install, service and maintain all plumbing mechanical items and systems.
- C. HVAC Work Information Required in Coordination Drawings:
 - 1. Sizes and bottom elevations of ductwork, piping with insulation thickness included.
 - 2. Fire dampers.
 - 3. Acoustical lining in ductwork.
 - 4. Identification of ductwork pressure class.
 - 5. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - 6. Fire-rated enclosures around ductwork.
 - 7. Support of all roof mounted HVAC piping and equipment.
 - 8. Required space to install, service and maintain all HVAC items and systems.
- D. Electrical Work Information Required in Coordination Drawings:
 - 1. Electrical Work, including telecommunications, data, security, lighting and fire alarm systems.
 - 2. Runs of vertical and horizontal conduit 1 inch diameter and larger.
 - 3. Light fixture locations.

- 4. Emergency egress light locations.
- 5. Smoke detector, and other fire alarm device locations.
- 6. Panelboard, switchboard, transformer, cable tray, and motor control center, and exit signs.
- 7. Location of pull boxes and junction boxes, dimensioned from column center lines.
- 8. Bottom elevation of all conduit runs 1-1/4 -inch diameter and larger and of all cable trays.
- 9. Support of all roof mounted conduit and photovoltaic equipment, cameras, and security system devices.
- 10. Required space to install, service and maintain all electrical items and systems.
- 11. Lightning protection.

E. Structural Work Information Required in Coordination Drawings:

- 1. Ceiling system.
- 2. Openings and sleeve locations required in slabs, walls, beams and other structural elements, including required openings not indicated on Contract Documents.
- 3. Slab edge locations and locations of sleeves dimensioned from building lines and floor lines.

F. Ceiling Systems and Plenum Space in Coordination Drawings:

- For mechanical, plumbing, fire alarm, electrical, controls, and telecommunications Work penetrating acoustical ceilings, show locations of each item (including sprinkler heads, diffusers, grilles, access doors, light fixtures, smoke detectors, exit signs, speakers, and other visible ceiling mounted devices) relative to acoustical ceiling grid or to wall in gypsum board ceilings.
- 2. Locate components within ceiling plenums to maximize clear area for future installations of lights and equipment.
- 3. Clearly indicate areas of conflict between light fixtures, diffusers and grilles and plenum boxes and other components on coordination drawings.
- 4. Draw elements to dimensions appropriate for products to be installed. Use of symbols is not acceptable.

3.3 TRADE CONFLICTS IN CAD DRAWINGS AND OTHER OVERLAY DRAWINGS

A. The General Construction Contractor shall review the Coordination Drawings and indicate areas of Architectural, Equipment, Structural and other conflicts and obstacles and coordinate locations of rated and exterior walls to assure their continuity and closure as specified. The each trade Contractor and/or Subcontractor shall determine that all work can be installed without interference. In the case of unresolved interference, the General Contractor shall notify the Architect. The Architect will then suggest to the General

Construction Contractor as to how to revise the Drawings to eliminate interference. The General Construction Contractor shall then have the trade(s) revise their respective Drawings to eliminate the interference.

1. Each Contractor or trade shall approve the Coordination drawings in writing indicating approval of installation coordination and clearances

3.4 PREPARATION OF COORDINATION DRAWINGS

- A. Organize coordination drawing submittals as follows:
 - 1. Floor Plans: Provide floor plans and reflected ceiling plans for all floors. Show architectural, structural, mechanical, plumbing, fire protection, fire alarm, electrical, and telecommunications elements on floor plans and reflected ceiling plans.
 - 2. Equipment Rooms and Spaces: Provide large scale drawings for equipment rooms and spaces showing plans and elevations of mechanical, plumbing, fire protection, electrical, and telecommunications equipment.
 - 3. Structural Penetrations: Provide coordination drawings for each floor indicating penetrations and openings required for all trades.
 - 4. In public and occupied areas without scheduled finish ceilings, appearance is a major coordination factor. Reposition proposed locations of work after Coordination Drawing review by the Architect. Provide adjustments to the exact size, location and offsets of ducts, pipes, and conduit to achieve reasonable appearance objectives. Provide these adjustments as part of the Contract or notify the Architect immediately as to why the adjustment cannot be made.
- B. Prepare coordination drawings to a scale of 1/4" = 1'- 0" or larger (1/2"= 1'-0" for mechanical room plans); detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
 - 1. Detail complex areas at larger scale than typical floor plans.
 - 2. Use a common architectural layout as background.
 - 3. Indicate ductwork, pipes with 6-inch diameter and greater, and conduits with 3-inch diameter and greater by double lines. Use single lines for smaller mechanical piping and all electrical conduits. Draw piping, ductwork, lighting fixtures, and cable trays in scale.
 - 4. Circle and clearly note deviations from Contract Documents with reason for deviation stated.
 - 5. Provide name of representative of each subcontractor whose Work is indicated on coordination drawings, verifying their review and approval that their Work has been coordinated with each other trade and with architectural and structural Work.

END OF SECTION 013115

SECTION 013200 - SCHEDULING AND PROGRESS

1.1 GENERAL

- A. Requirements set forth herein are in addition to and shall be considered as complementary to the General Conditions and the balance of Division #1 and Technical Specifications.
- B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.

1.2 REQUIREMENTS INCLUDED IN THIS SECTION

- A. Preliminary Requirements
- B. Commencement, Prosecution and Completion of the work
- C. Submittal Schedule
- D. Project Progress Schedule
- E. Breach of Contract
- F. Time of Completion

1.3 PRELIMINARY REQUIREMENTS

- A. Within three (3) working days after bids are opened, and before the Contract is executed, the three (3) apparent low bidder for each trade/contract must submit to the Architect, in writing, a list of duration's and a sequence, in the form of a bar chart, for all activities that are the responsibility of the bidder. Contractor's proposed work force and other resource loading for each activity of the bar chart, broken down by trades, must also be provided. Failure to comply with this requirement may be cause for rejection of the bid.
- B. The apparent low bidders, concurrent with the submission of bar chart, shall also submit to the Architect, in writing, the following information:
 - 1. Shop drawing and material sample schedules keyed to the duration's submitted in the bar chart. (See Section 01 33 00)
 - 2. Schedules for the award of subcontractor and equipment contracts keyed to the duration's submitted for the bar chart.
 - 3. The name of the person who, as Scheduling Coordinator for the apparent low bidder, is authorized to act on behalf of the apparent low bidder on all matters of scheduling included in this Section. Once named, the Scheduling Coordinator may only be replaced after written notice is given to the Owner's Representative and Architect. The Contractor agrees, upon the request of either of the two parties, to replace the Scheduling Coordinator.
- C. Failure to comply with this subsection 1.03 of this Section of the General Requirements may be cause for rejection of the bid and forfeiture of security.

1.4 COMMENCEMENT, PROSECUTION AND COMPLETION OF THE WORK

A. Contractor shall commence work under this contract upon receipt by him of Letter of Intent to Award, Notice to Proceed, and/or

Execution of the Contract and shall prosecute said work diligently and complete the work within the stated calendar days for each portion of the work as set forth in Section 01 10 00.

- B. The time stated for completion for contract work includes final cleanup of area. Upon completion of total Contract work, ALL AREAS SHALL BE CLEAN.
- C. The Contractor is to carry on responsibility for services and maintenance of such items as temporary roads, walks, ramps, field offices, parking areas, environmental controls and the like until work under this contract is complete, unless otherwise directed by the Owner. Coordinate work herein with Section 01 10 00, Description of Work.

1.5 SUBMITTAL SCHEDULE

- A. Within two (2) weeks after receipt of Letter of Intent to Award, Notice to Proceed, and/or Execution of the Contract, the General Contractor shall prepare a detailed listing of all items to be incorporated within the work, including all items of mechanical and electrical. This information will be incorporated in the "PPS" as prepared by the "General Contractor" in accordance with Paragraph 1.6 of this Section. Listing should generally include the following:
 - 1. Overall project milestones
 - 2. Proposed products list and statue report on material orders
 - 3. Dates of shop drawing/sample submittals
 - 4. Guaranteed delivery dates after shop drawing and/or sample approvals
 - 5. Date of installation start
 - 6. Date of installation completion

1.6 PROJECT PROGRESS SCHEDULE

A. Within two (2) weeks after receipt of Letter of Intent to Award, Notice to Proceed, and/or Execution of the Contract, but prior to the actual start of the field work, the Contractor shall submit to the Architect for his approval the proposed Project Progress Schedule giving the information listed below.

The minimum information contained within the required project progress schedule shall consist of:

- 1. The estimated dates the various classes of work included in the Schedule of Values will be started and completed.
- 2. The estimated percentages of completion to be obtained and the total dollar value of the various classes of said work projected to the end of each calendar month until substantial completion. Calculations shall be based upon work in place; materials on site and not installed; materials fabricated and stored under suitable conditions and insured to full value in a manner satisfactory to Architect and Owner; and such other items as may be agreed to among the Contractor, Architect and Owner.
- 3. The estimated delivery and installation dates of the major pieces of equipment to be furnished and installed by the Contractor.
- 4. The estimated projected progress of work that will be performed away from the job site.
- 5. A delineation of the work that will be performed by the Contractor's

own forces and by his Subcontractors.

- 6. The estimated calendar dates on which all the work under the contract will be completed and ready for substantial completion and final inspections.
- B. The Project Progress Schedule shall be based on an orderly progression of the Work, allowing adequate time for each operation, and leading to a reasonable certainty of Substantial Completion by the date established in Section 01 10 00.
- C. The schedule will be reviewed by the Construction Manager, Architect and Owner's Representative for compliance with the requirements of this article and will be accepted by them or returned to the contractor for revision and resubmittal.

<u>Unless specifically required by law, no payment under this Contract shall be due until the Progress Schedule has been submitted to the Architect, Construction Manager, and Owner's Representative and approved by all parties.</u>

D. As the work progresses, an up-to-date copy of the schedule with the actual percent completion of the various classes of the work indicated in red shall be submitted by the contractor to the Architect and/or Owner's Representative during the first week of each calendar month. (Distribution to be established as part of "preconstruction meeting").

The schedule may be adjusted and revised to meet unforeseen job conditions, but such changes shall, at all times, be approved by the Architect and the Owner's Representative in writing.

E. A copy of the schedule shall be available at all times at the job site for the inspection and guidance of other Contractors, Subcontractors and Vendors engaged on any construction phase of the project.

It shall be the responsibility of Each Contractor to ascertain that all his Subcontractors, Vendors and Material men periodically consult the Schedule so that their work schedule shall be maintained in conformance with his own.

It shall also be the responsibility of Each Contractor to periodically consult the Job Progress Schedules of any other Contractors that may be engaged on any separate construction of the project, so that undue delay in progress on their part shall not delay the work of the other Contractors.

F. AN UP TO DATE COPY OF PROJECT PROGRESS SCHEDULE MUST BE ATTACHED TO MONTHLY REQUISITION IN ORDER FOR PROCESSING TO BEGIN.

INCOMPLETE REQUISITIONS WILL BE REJECTED.

1.7 BREACH OF CONTRACT

A. In addition to the Owner's right to terminate the contracts as set forth in the 01 32 00 - 3 Scheduling & Progress

Contract Documents, including Article 17 of the General conditions; the Contractor's failure to comply with any requirement called for in subsections 1.04, 1.05 and 1.06 above shall constitute a material breach of the Contract, and the Owner shall have the right to and may terminate the Contract, provided, however, that the failure of the Owner to so terminate shall not relieve the Contractor from future compliance.

- 1.8 TIME OF COMPLETION Coordinate with Contract and General Conditions and Section 01 10 00.
 - A. Notwithstanding the implementation of the Construction Schedule, it is the sole responsibility of the Contractor to complete the Work within a Contract Time which will assure the substantial completion of the Project by the required date.

End of Section

SECTION 013300 - SUBMITTAL REQUIREMENTS

NOTES:

- SUBMISSIONS CAN BE MADE ELECTRONICALLY PROVIDED THAT SAID SUBMISSIONS FOLLOWS THE CRITERIA OUTLINED HEREIN AND BOTH THE FORMAT FOR THE OVERALL PROCESS IS AGREED TO BETWEEN ALL PARTIES PRIOR TO INITIAL START OF THE PROJECT.
- SUBMITTAL TRANSMISSIONS SHALL BE LIMITED TO THE TECHNICAL PRODUCT AND DRAWING REQUIREMENTS ONLY. MSDS DATA SHALL NOT BE TRANSMITTED AS AN INTEGRAL PART OF THE SUBMITTAL BUT SHALL BE INCLUDED AS A SEPARATE DOCUMENT FOR THE EXPRESS PURPOSE OF ASSEMBLING THE REQUIRED FIELD MANUAL AS SPECIFIED HEREIN.
- ALL SUBMITTALS SHALL BE MADE THROUGH THE SUBMITTAL EXCHANGE PROCESS – EMAIL TRANSMITTAL OF SAME WILL NOT BE ACCEPTED AND WILL BE RETURNED WITHOUT REVIEW.
- ALL COSTS INVOLVED WITH THE IMPLEMENTATION AND MAINTENANCE OF THE SUBMITTAL EXCHANGE WILL BE DEEMED AT THE SUBMITTING CONTRACTOR'S EXPENSE.

1.1 GENERAL

- A. Requirements set forth herein are in addition to and shall be considered as complementary to the General Conditions of the Contract and the balance of Division #1 and Technical Specifications.
- B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.
- C. Definitions as apply to "Contractors" involved with the work of this Project shall be as set forth in Section 01 10 00, Article 1.01.
- D. Where practical, submittals shall be made in groupings where installations are complimentary. *Failure to comply with this requirement will be cause for rejection of any or all submittals*.

Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

E. The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.

1.2 REQUIREMENTS INCLUDED IN THIS SECTION

- A. Related Work Specified Elsewhere.
- B. Approved Equal Clause/Substitutions/Options
- C. Certification.
- D. Manufacturer's Instructions
- E. Submittal Instructions

- F. Shop Drawings
- G. Samples
- H. Material Safety Data Sheet (MSDS) Submittals
- I. Proposed Products List and Status Report on Material Orders
- J. Scheduling of Submittals
- K. Job Progress Schedule
- L. Coordination Drawings
- M. Progress Photographs
- N. Certificates
- O. Construction Waste Management Procedures and Certifications See Section 01 74 19.
- P. V.O.C. Compliance certification See individual technical sections.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. 01 29 00 Applications for Payment and the Schedule of Values
- B. 01 32 00 Scheduling and Progress
- C. 01 33 00 Photographic Documentation
- D. 01 43 26 Testing Laboratory test and inspection reports
- E. 01 77 00 Project Closeout requirements
- F. 01 77 19 Project Record Documents
- G. Divisions 2 through 33 Sections for specific requirements for submittals in those Sections

1.4 CERTIFICATION

- A. Certification of compliance with specification performance standards and manufacturers' specifications and directions shall be furnished for any portion of this work for which specific performance requirements and/or manufacturers' specifications are listed. It shall be the responsibility of the Contractor to secure two (2) copies of each certification when required and transmit same to the Architect.
- B. Sample Certification Form (2 pages) Section 01 33 06 as an exhibit at the close of this Section. Each item requiring certification shall be so noted and affidavits shall be filed singly to cover each specified material, installation, application and the like. CERTIFICATIONS SHALL BE SUBMITTED AS PART OF THE CLOSE OUT DOCUMENT REQUIREMENTS SET FORTH IN SECTION 01 77 00.

1.5 MANUFACTURER'S INSTRUCTIONS

A. Where in these specifications an item is called for to be installed in accordance with the manufacturer's directions, specifications or recommendations, the Contractor shall furnish the Architect with two (2) printed copies of said directions, specifications or recommendations, before the item is installed.

1.6 SUBMITTAL INSTRUCTIONS

A. Transmit each submittal, except sample installations and sample panels to the Architect. Transmit submittals with Submittal Cover Sheet attached as Section 01 33 02. On the Cover Sheet identify Contractor, indicate date of submittal, and include information prescribed by form and required in paragraph entitled, "Submittal Requirements" of the individual technical Section and as follows. Process transmittal forms to record actions regarding sample installations and panels.

1.7 SHOP DRAWINGS

- A. The following serves as a further definition of the requirements for shop drawing submittals as covered in Article 6(Y) of the General Conditions:
 - 1. The Contractor shall submit to the Architect with such promptness as to cause no delay in the work, layout, detail, schedule, setting, product data and shop drawings for each part of the work as specified or required.
 - a. Submission of data for review by the Structural and Mechanical/Electrical Engineers shall be sent directly to those Engineers with duplicate transmittals sent to the Architect.
 - 2. ANY BEFORE SUBMITTING DATA FOR APPROVAL. THE CONTRACTOR SHALL CHECK THE SUBMITTALS OF ALL SUBCONTRACTORS FOR ACCURACY AND **CONTRACT** COMPLIANCE. ALL SUBMITTALS SHALL BE UNDER THE COVER SHEET ATTACHED HERETO. SUBMITTALS NOT COMPLYING WITH THE ABOVE SHALL BE RETURNED TO THE SUBMITTING CONTRACTOR WITHOUT EXAMINATION BY THE ARCHITECT. Contractor shall see that all work contiguous with and having bearing on work indicated on drawings is accurately and distinctly illustrated and that work shown is in conformity with contract requirements.
 - 3. Shop drawings shall be numbered consecutively and shall represent:
 - a. All working and erection dimensions.
 - b. Arrangement and sectional views.
 - c. Necessary details, including information for making connections to other work.
 - d. Kinds of materials and finishes. Colors, where applicable
 - 4. Shop drawings shall be dated, and shall generally contain:
 - a. Name and Number of project.
 - b. Name, address and telephone number of submitting Contractor.
 - c. Description of required equipment, materials, and classification item numbers.
 - d. Locations at which materials or equipment are to be installed in the Work.
 - e. Identification of drawings, schedules, notes and/or details and_ specification sections and related paragraphs/articles to which they apply.
 - f. Equipment or fixture identification corresponding to that used in Contract Documents.
 - g. Accessories and special or non-standard features and materials which are being furnished.
 - h. Properly marked with external connection identification as related to the project where they consist of standard factory assembly or field installation drawings.

In addition to the general data required above, mechanical and electrical submissions shall contain:

- a. Manufacturer's specifications including materials of construction, metal gauge, thickness and finish.
- b. Certified dimensional drawings including clearances required for maintenance or access (coordinate with Section 01 31 14)
- c. Performance data, ratings, operating characteristics, and operating limits.
- d. Electrical ratings and characteristics.
- e. Wiring and control diagrams, where applicable.
- f. Certifications requested, including UL label or listing.
- g. List of accessories which are required but are NOT being provided by the product manufacturer or are NOT being furnished under this Section. Identify the Section(s) under which the accessories are being furnished.
- 5. Submission of data for approval shall be accompanied by letter of transmittal, in duplicate, containing the name of the project, Contractor's name, number of drawings, titles and other pertinent data.
- 6. Procedure for Submitting Shop Drawings and Product Data

7.

a. After completion of checking, the Architect, and Engineer (as appropriate) will retain one print for his record and return the remaining copies to the submitting Contractor.

The average "turnaround time" of any one in-house submittal by the Architect shall not exceed 15 business days for review and at least 20 business days when another consultant is involved.

- b. For drawings returned "Resubmit," "Amend & Resubmit," "Disapproved" or "Rejected-Resubmit," the original drawings shall be corrected, and resubmitted until final approval.
 - <u>NOTE</u>: The Owner reserves the right to backcharge the Contractor for the additional costs beyond the review of any resubmittal.
- c. For drawings returned "Approved", "No Exceptions Taken", "Approved as Noted", and "Make Corrections Noted", the Contractor shall obtain and provide sufficient prints as required for the field.

Note: It is the responsibility of the Contractor to confirm all dimensions, quantities, and the coordination of materials and products supplied by him with other trades. Approval of shop drawings containing errors does not relieve the contractor from making corrections at his expense.

- 8. No work as called for by shop drawings shall be done until Architect's approval.
- 9. IF SUBMITTALS SHOW VARIATIONS FROM CONTRACT REQUIREMENTS BECAUSE OF STANDARD SHOP PRACTICES, OR OTHER REASONS, CONTRACTOR SHALL MAKE SPECIFIC MENTION OF SUCH VARIATION IN HIS LETTER OF TRANSMITTAL.
- 10. APPROVAL OF SHOP DRAWINGS IS GENERAL. IT SHALL NOT RELIEVE CONTRACTOR OF THE RESPONSIBILITY FOR ACCURACY OF SUCH DRAWINGS, NOR FOR THE FURNISHING OF MATERIALS OR PROVISION OF WORK REQUIRED BY THE CONTRACT AND NOT SHOWN ON THE SHOP DRAWINGS.

Unless it is an interpretation of design intent, approval of shop drawings shall not be construed as approval of departures from Contract.

- 11. <u>If the Contractor should alter any information on previous submittals, besides the notations called for by the Architect, he must circle this new information to bring it to the Architect's attention.</u>
- 11. Where practical, in submitting data for approval, all associated drawings, product data and the like, relating to a complete assembly shall be submitted at one and the same time so that each may be checked in relation to the entire proposed assembly.

PARTIAL SUBMISSIONS WILL BE RETURNED WITHOUT ACTION TAKEN. EXTRANEOUS MATERIAL ON PRODUCT DATA SHEETS SHALL BE STRUCK PRIOR TO SUBMITTAL.

Resubmittals of any data shall be "complete", i.e. – Lighting Fixture resubmittal shall include all fixtures whether or not some have been approved so that when the entire submittal is approved, a full record copy is on file.

12. Contractor shall have copies of all approved shop drawings as listed in Paragraph 1.06.A.6 above on the job at all times and shall make them available to the Architect or the Owner's representatives.

1.8 SAMPLES

- A. The following serves as a further definition of the requirements for sample submittals as covered in Article 6(Y)of the General Conditions:
 - Names of proposed manufacturers, materialsmen and dealers who are to furnish materials, fixtures, appliances or other fittings shall, where practical, be submitted to the Architect for early approval to afford proper investigation and check.
 - No manufacturer will be approved for any materials to be furnished under this contract unless he shall be of good reputation and shall have plant of ample capacity and shall have successfully produced similar products.
 - 3. All transactions with manufacturers and subcontractors shall be through

the Contractor.

- 4. Unless otherwise specified, samples shall be in duplicate (2) and of adequate size to show quality, type, color, range, finish, texture, etc. Deliver one (1) sample to field office and one (1) sample to Architect's office unless otherwise directed.
- 5. Each sample shall be labeled, bearing material and quality names, submitting Contractor's name, and project name, and other pertinent data.

In accordance with OSHA regulation Number 1910.1200, a Material Safety Data Sheet (MSDS) shall be submitted for each product to be incorporated in the work.

The sole purpose for requiring submittal of MSDS sheets as outlined herein and respective technical sections is to advise the Contractor that health and safety is of primary importance to the execution of the work and for the future occupants of the project under construction. It is to be assumed, and will be enforced, that the submission of MSDS sheets be made as a separate package, covered by its own transmittal and marked "for evidence of legal compliance". This submission will be noted and returned with a stamp indicating "SUBMITTED INFORMATION ONLY, NOT REVIEWED".

Failure to observe these submittal requirements will be cause for rejection of the entire submittal.

The safe handling of products by the applicator according to MSDS warnings is a safety issue, like any other, entirely within the purview of the Contractor.

- 6. Where Specifications require manufacturer's printed installation directions, such directions and diagrams shall accompany samples. Coordinate with Paragraph 1.05 herein
- 7. A duplicate letter of transmittal from the submitting Contractor requesting approval of the sample shall accompany the samples.
- 8. Transportation charges to designated locations must be prepaid on all samples.
- 9. Materials shall not be ordered until approval is received in writing from the Architect. All materials shall be furnished equal in all respects to the samples which were approved.

1.9 MATERIAL SAFETY DATA SHEET (MSDS) SUBMITTALS

- A. As specified in Paragraph 1.07 of this Section and within the technical sections forming this Specification, the Contractor is directed to the following requirements concerning "MSDS" submissions.
 - 1. Submit MSDS's for all products used during construction whether incorporated within the work or used in the performance of the work.
 - 2. Identify which products may be harmful to construction workers or

- other building occupants.
- 3. Develop means and methods for protection of construction workers and other building occupants from potentially harmful products. **Submit** said means and methods to the Owner for review and approval.
- B. Further, the Contractor with assistance from each individual contractor shall maintain a "MSDS" file on site, accessible to workers and otherwise in compliance with jurisdiction's "Right To Know" legislation.
- C. Attention is directed Section 01 77 00, Article 1.04.A.5 for final closeout submittal of MSDS compilation to the Owner.

1.10 CERTIFICATES

- A. Submit a Summary of Solid Wastes Generated, manifests, weight tickets, and the like in accordance with requirements of Section 01 74 19 Construction Waste Management.
- B. Submit, as required by each technical section a certification for V.O.C. compliance.

End of Section

CONTRACTOR REQUEST FOR ELECTRONIC DRAWING FILES

The Architect, for the convenience of the Client/Owner, has electronic copies or representations of Drawings, Specifications and Project Manuals. Requests for electronic copies of such Drawings, Specifications and Project Manuals by the Contractor, for the Contractors use or the use of Subcontractors, shall be made in writing to the Client/Owner as outlined hereinbelow and shall outline the benefit derived from such a request. The Contractor shall be prepared to reimburse the Client/Owner for any costs involved in preparing such electronic documents for the Contractors use.

Architect's Project Number:	
Project Name:	
Architect:	
Client/Owner:	
Contractor/Recipient's Name:	
Attention to:	
Contractor/Recipient's Address:	
Date of Request:	
Date of Release:	

As requested, attached is a list of electronic drawing files. For the release of these electronic drawing files to the recipient, the following items shall be understood, acknowledged and signed by the authorized personnel of the recipient with the fee included.

- A. The electronic drawing files are the property of the Architect and the Contractor is granted a license to use the electronic files only in connection with the subject project.
- B. The electronic drawing files do not necessarily represent the Contract Documents associated with the referenced project. These files are solely for the use of the recipient and are not a representation of the scope of work for the project. Any use by contractors, subcontractors or fabricators shall be on all of the same terms and conditions being applicable to such users who shall acknowledge the same in writing. The Recipient may use the electronic drawing files only. Electronic drawing files or portions thereof, shall not be provided to anyone else without the written approval of the Client/Owner. The use of the electronic drawing files, documents and any reprographics shall not identify any member of the Architect or Architect's consultants or sub- consultants or the Client/Owner without the written approval from the parties.
- C. The entire risks as to the results and performance of the package including the

electronic drawing files. assumed by the Contractor/recipient. The are Client/Owner, the Architect and the Architect's consultants and sub-consultants, including directors, employees, representatives, and licensors of the company, shall not have any liability to the Contractor/recipient or any other person or entity for any direct, indirect, incidental special or consequential damages whatsoever, including, but not limited to, the loss of revenue or profit, lost data, or any other personnel, commercial or economic loss, and claims by third parties. Even if the Client/Owner and Architect and the Architect's consultants and sub-consultants has been advised of the possibility of such damages; said Client/Owner and Architect and the Architect's consultants and sub-consultants shall not be held liable as stated above.

- D. The Contractor/recipient hereby agrees to indemnify and hold the Client/Owner, the Architect and the Architect's consultants and sub- consultants harmless from and against any cost, damage, liability, loss or claim arising from violation of this license. The Contractor/recipient and all subcontractors of all tiers also agrees that, in addition to all other remedies hereunder, the Contractor/recipient and such parties grant the Client/Owner the right to seek injunctive or other equitable relief to prevent the violation or require the performance of any of the Contractor's/recipient's obligations under this license, and the Contractor/recipient hereby consents to the issuance of such relief by any court of competent jurisdiction without the need to post any bond or security.
- E. The electronic files requested are as follows:

Electronic file name	Corresponding Drawing (close approximation)
1.	
2.	
3.	
Etc.	
Total number of files:	

CONTRACTOR'S/RECIPIENT'S AGENT SIGNATURE:	
NAME IN BLOCK LETTERS:	
AUTHORIZED POSITION HELD:	
DATE OF SIGNATURE:	

End of Section

SUBMITTAL COVER SHEET

Contractor:	
Address:	Telephone: ()
Owner: Orange-Ulster BOCE	ES
Name of Project: OU BOCES	Arden Hill Interior Alterations Third Floor
TYPE OF SUBMITTAL:	
Shop Drawings Technical Data Test Report	□ Schedule □ Physical Sample □ Certificate □ Color Sample □ Warranty □
Submission #: 1st 2nd 3rd 4th	(circle one)
Description:	
Product Identification:	
	EFERENCES: (Must be fully filled out)
Spec Section No.:	Drawing No(s):
Paragraph:	Rm. Or Det. No(s):
Contractor Remarks:	Contractor Submittal Review Stamp
	THE ATTACHED MATERIAL HAS BEEN REVIEWED BY THE UNDERSIGNED AND IS BELIEVED TO COMPLY WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS. THE UNDERSIGNED UNDERSTANDS VERIFICATION OF FIELD DIMENSIONS, AND COORDINATION WITH OTHER TRADES, REMAINS THE RESPONSIBILITY OF THE CONTRACTOR.
	DATE: BY (SIGN):
Consultant use below this line:	Architect Submittal Review Stamp
	□NO EXCEPTIONS □MAKE CORRECTIONS NOTED □REJECTED □REVISE AND RESUBMIT □EXAMINED □SUBMIT SPECIFIED ITEM
	CHECKING IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS & SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS WHICH SHALL BE CONFIRMED & CORRELATED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF HIS WORK WITH THAT OF ALL OTHER TRADES & THE SATISFACTORY PERFORMANCE OF HIS WORK
	KG+D ARCHITECTS, P.C.
	DATEBY

Original and One Copy to:

Orange-Ulster BOCES Interior Alterations – Third Floor Regional Education Center at Arden Hill

CERTIFICATION OF SPECIFICATION COMPLIANCE

I/WE, the MANUFACTURER/SUPPLIER and INSTALLER of
as specified in Section Numberof the Contract Documents prepared by KG+D Architects, PC, 285 Main Street, Mount Kisco, NY, 10549, for the:
Orange-Ulster BOCES Interior Alterations – Third Floor Regional Education Center at Arden Hill
SED No: 44-90-00-8-035-008
do (does) herein certify that -
 All materials furnished for said project do fully comply with all specification requirements as stated within the Contract Documents;
2. That no asbestos containing materials of any nature are used in the work;
3. That execution of the Work covered by this certification has been performed in accordance with the drawings prepared by the design professional team.
CONTRACTOR:
CERTIFICATION BY: TITLE:
ADDRESS:
CERTIFICATION DATED:
Distribution:

KG+D Architects, PC 285 Main Street

Mount Kisco, NY 10549

22 September 2023 44-90-00-00-8-035-008 Bid Issue Orange-Ulster BOCES Interior Alterations – Third Floor Regional Education Center at Arden Hill

CERTIFICATION OF SPECIFICATION COMPLIANCE

CORPORATE ACKNOWLEDGEMENT

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SECTION 013529 - HEALTH AND SAFETY PLAN

PART 1 – GENERAL

1.1 GENERAL

- A. Requirements set forth herein are in addition to and shall be considered as complementary to the General Conditions of the Contract and the balance of Division #1 and Technical Specifications.
- B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.
- C. Definitions as apply to "Contractors" involved with the work of this Project shall be as set forth in Section 011000.

1.2 REQUIREMENTS INCLUDED IN THIS SECTION

- A. Provide all labor, equipment and materials and perform all operations in connection with monitoring air quality, decontaminating equipment and providing worker health and safety protection for all Contractor and Subcontractor personnel.
- B. Develop a site-specific Health and Safety Plan (HASP) specifically addressing the potential hazards that may be encountered. This plan shall meet all Occupational Safety and Health Administration (OSHA) requirements.
- C. Review the requirements and data presented and supplement the program with any additional measures deemed necessary to fully comply with regulatory requirements and adequately protect personnel on the site.

1.3 REFERENCES

- A. OSHA Regulation 29 CFR 1910.120
- B. OSHA Regulation 29 CFR 1926.62

1.4 DEFINITIONS

- A. Site Safety Official (SSO): The individual who is responsible to the Contractor and has the authority and knowledge necessary to implement the site safety and health plan and verify compliance with applicable safety and health requirements.
- B. SSO shall possess full and complete authority to order stoppage of any work which he deems unsafe.

1.5 SUBMITTALS

- A. Provide within seven (7) days after execution of the Agreement.
 - Site-specific HASP including the Emergency Response Plan to the Owner, Owner's Representative and Architect for review, including provisions for decontamination and a contingency plan for unforeseen emergencies. The review is only to determine if the HASP meets basic regulatory requirements and the minimum requirements of this Section. The review will not determine the adequacy of the HASP to address all potential hazards, as that remains the sole responsibility of the Contractor.

- 2. Current certification of employee's health and safety training and certification of employee's baseline medical exam status.
- 3. Certification of additional required health and safety training for Supervisors.
- 4. Qualifications and experience of the SSO for approval.
- B. Submit minutes of weekly safety meetings at periodic progress meetings.
- C. Refer to related submittal requirements in Section 028200 Asbestos Abatement for project.

1.6 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor is solely responsible for the health and safety of workers employed by the Contractor, any Subcontractor and anyone directly or indirectly employed by any of them.
- B. Develop and follow a site-specific Health & Safety Plan (HASP) in accordance with the requirements of paragraph 1.07.
- C. Provide a full-time SSO regardless of whether or not the Work is at a defined Uncontrolled Hazardous Waste Site.
- D. Pre-arrange emergency medical care services at a nearby hospital, including establishment of emergency routes of travel.
- E. Meetings:
 - Conduct daily job briefings with all site personnel to discuss relevant health and safety issues including but not limited to hazards, monitoring, procedures and controls. Document attendance and topics covered.
 - 2. At a minimum, conduct weekly safety meetings with all site personnel, documenting attendance and topics covered.
- F. Train all workers assigned to areas where contaminated media are likely to be encountered in accordance with 29 CFR 1910.120.
- G. Include those workers involved with the abatement of Asbestos containing materials in a medical surveillance program and respiratory protection program that meet the requirements of 29 CFR 1910.120 and 29 CFR 1910.134, respectively.
- H. In areas where contaminated media are likely to be encountered, monitor air quality in and around work area using appropriate air monitoring equipment/analysis, as indicated in Part 2. Record all readings and maintain record on site. Stop work and/or upgrade respiratory protection or personal protective equipment levels if action levels established in the HASP are exceeded. Ensure that degree and type of respiratory protection provided is consistent with the monitored concentrations and individual chemical parameters. Lawfully dispose of all contaminated clothing and equipment that cannot be decontaminated.

1.7 HEALTH & SAFETY PLAN (HASP) REQUIREMENTS

- A. The following items shall be addressed in the HASP:
 - 1. Safety and health hazard assessment
 - 2. Procedures for emergency medical treatment and first aid
 - 3. Map indicating route to hospital for emergency medical care
 - 4. Lead Exposure Control Plan (29 CFR 1926.62)
 - 5. Equipment decontamination procedures
 - 6. Air monitoring procedures and action levels

- 7. Personal protective equipment and decontamination
- 8. Physical hazard evaluation and abatement including:
 - a. Equipment operation
 - b. Confined space entry
 - c. Slips and falls
 - d. Building collapse
 - e. Falling debris
 - f. Encountering unmarked utilities
 - g. Cold and heat stress
 - h. Hot work (cutting and welding)
 - Excavation entry
- 9. Training requirements
- 10. Recordkeeping requirements
- 11. Emergency response plan that includes:
 - Names of three (3) emergency response contractors, experienced in the removal and disposal of oils and hazardous chemicals, that the contractor intends to use in the event of an emergency
 - b. Evacuation routes and procedures
 - c. Emergency alerting and response procedures

1.8 CONTINGENCY MEASURES & NOTIFICATIONS

- A. The potential for encountering hazardous buried objects or materials that could pose a threat to human health or the environment exists at the Project Site. In the event that potentially hazardous materials are encountered during the work under this contract, the responsibilities of the Contractor and the Owner's Representative are described herein.
- B. The procedures and protocols to be used by the SSO in defining materials that are potentially hazardous include screening with a photoionization detector, odor, visual appearance of a material, and obvious oil or chemical contaminated materials.
- C. Upon encountering suspected hazardous buried objects or materials as described above, cover the excavation immediately if no imminent danger, as defined by the SSO, is present. If there is an imminent danger, as defined by the SSO, evacuate the area immediately. The SSO shall then notify the Owner's Representative of the situation.
- D. Establish, properly barricade, and mark the area as an exclusion zone under the direction of the SSO. The SSO shall establish the exclusion zone boundaries based upon air quality monitoring using a photoionization detector and other equipment as appropriate. The exclusion zone shall be established at a minimum 50-foot radius around the location where the potentially hazardous material is encountered. Work within the exclusion zone shall be discontinued until the hazardous condition has been remediated and testing indicates that a hazard does not exist. Other activities of the site, outside the limits of the exclusion zone shall continue. Ambient air quality monitoring shall be performed by the SSO to demonstrate that ambient air quality in other portions of the site is not adversely impacted by the exclusion zone condition.
- E. Notify Owner's Representative regarding the presence of potentially hazardous materials. Owner's Representative may direct the Contractor to notify

- regulators and to obtain necessary regulatory approvals for remediation.
- F. Mobilize the appropriate equipment and personnel to sample and test the hazardous material within the exclusion zone to determine the remedial action required, subject to the Owner's Representative's direction. Contractor may be directed to remove and legally dispose of the material. Compensation for the removal and disposal of hazardous material will be as a Change in Work and Change in Contract Price in accordance with the Subcontract Agreement, if not covered under a specific bid item.

PART 2 - PRODUCTS

2.1 AIR MONITORING EQUIPMENT

- A. Provide and maintain portable photoionization detector or organic vapor analyzer capable of detecting organic vapors or total hydrocarbons. Equipment shall be sensitive to the 0.5 PPM level.
- B. Provide and maintain an oxygen analyzer to measure oxygen concentration in any trench or confined space prior to entry, as determined by the SSO.
- C. Provide and maintain an explosimeter whenever the potential for accumulation of explosive gases exists, as determined by the SSO.
- D. Provide and maintain air monitoring equipment as required for the collection/monitoring of airborne asbestos fibers. All air samples related to abatement work shall be analyzed by a laboratory accredited by the American Industrial Hygiene Association.
- E. All air monitoring equipment shall remain the property of the Contractor.

PART 3 - EXECUTION - NOT USED

End of Section

SECTION 014100 - PERMITS AND COMPLIANCE

1.1 GENERAL

- A. Requirements set forth herein are in addition to and shall be considered as complementary to the General Conditions and the balance of Division #1 and Technical Specifications.
- B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.

1.2 REQUIREMENTS INCLUDED

- A. Permits and Licenses
- B. Compliance
- C. Additional Compliance

1.3 PERMITS AND LICENSES

A. The Contractor shall obtain, maintain and pay for all permits and licenses necessary for the execution of the work and for the use of such work when completed.

1.4 COMPLIANCE

A. The Contractor shall give all notices, pay all fees and comply with all laws, rules and regulations applicable to the work.

1.5 ADDITIONAL COMPLIANCE

- A. The Contractor, Subcontractors, and the employees of the Contractor and Subcontractors, shall comply with all regulations governing conduct, access to the premises, operation of equipment and systems, and conduct while in or near the premises and shall perform the work in such a manner as not to unreasonably interrupt or interfere with the conduct of business of the Facility.
- B. Further, attention is directed to requirements of Section 011500.

End of Section

SECTION 014200 - SPECIAL INSPECTIONS AND TESTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for performing Special Inspections and Tests in accordance with requirements of Chapter 17 of the *Building Code of New York State* (BCNYS). Testing and inspecting services are required to verify compliance with requirements specified or indicated in the contract documents. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1.2 DEFINITIONS

- A. Registered Design Professional: The Registered Architect whose seal appears on the Construction Drawings.
- B. Testing/Inspecting Agency: An agent retained by the Owner and coordinated by the Special Inspector, to perform some of the testing and/or inspection services on behalf of the Special Inspector. (An example of an Inspecting Agency would be a Geotechnical Engineer).
- C. Statement of Special Inspections: A document prepared by the Registered Design Professional that includes the Schedule of Special Inspections listing the materials and work requiring Special Inspections. A copy of this document is included at the end of this Section.
- D. Continuous Special Inspection: The full-time observation of work requiring Special Inspections by the Special Inspector who is present in the area where the work is being performed.
- E. Periodic Special Inspections: The part-time or intermittent observation of work requiring Special Inspections by the Special Inspector who is present in the area where the work has been or is being performed and at the completion of the work

1.3 CONTRACTOR RESPONSIBILITIES

- A. Contractor shall cooperate with the Special Inspector and his agents so that Special Inspections and testing may be performed without hindrance.
- B. Contractor shall notify the Special Inspector and/or Testing/Inspecting Agency at least 48 hours in advance of a required inspection or test. Contractor shall coordinate sequence of activities to accommodate required inspection and testing services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

- 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- C. The Contractor shall provide incidental labor and facilities to provide access to the work to be inspected or tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, and for storage and curing of test samples.
- D. The Contractor shall keep at the project site the latest set of Construction Drawings, field sketches, accepted shop drawings, and specifications for field use by the Inspectors and Testing Technicians.
- E. The Special Inspection program shall in no way relieve the Contractor of his obligation to perform work in accordance with the requirements of the Contract Documents or from implementing an effective Quality Control program.

1.4 QUALITY CONTROL

- A. Construction Manager will hold a Special Inspections preconstruction meeting at least 7 days prior to the initial planned date for start of construction.
 - 1. Discussion shall include review of specifications and Schedule of Special Inspections for work requiring Special Inspections; responsibilities of Contractor, Owner, Testing Agency, Special Inspector, and Registered Design Professional; notification procedures; and reporting procedures.
 - 2. Attendees shall include the Contractor, Owner's representative, Testing Agency, Special Inspector, and Registered Design Professionals for Structural Engineering and for Architecture.

1.5 LIMITS ON AUTHORITY

- A. The Special Inspector or Testing/Inspecting Agency shall not release, revoke, alter, or enlarge on the requirements of the Contract Documents.
- B. The Special Inspector or Testing/Inspecting Agency shall not have control over the Contractor's means and methods of construction.
- C. The Special Inspector or Testing/Inspecting Agency shall not be responsible for construction site safety.
- D. The Special Inspector or Testing/Inspecting Agency shall not have the authority to stop the work.

1.6 STATEMENT OF SPECIAL INSPECTIONS

A. The Statement of Special Inspections and Tests, on the form included at the end of this Section, will be prepared by the Registered Design Professional.

B. Required inspections and tests are described in the Schedule of Special Inspections and Tests attached to the end of this Section and in the individual specification sections for the items to be inspected or tested.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used).

END OF SECTION 014200 ATTACHMENTS SPECIAL INSPECTION NON-CONFORMANCE REPORT FORM NYSED STATEMENT OF SPECIAL INSPECTIONS AND TESTS

SPECIAL INSPECTION NON-CONFORMANCE REPORT NO.

DATE:			
TO:	Registered Design Professional (RDP) KG+D Architects, PC 285 Main St., Mount Kisco, NY 10549		
CC:	Contractor:		
FROM:	, Special	Inspector	
PROJECT:	Orange Ulster BOCES – Alterations to Thir KG+D Project #2023-1008	d Floor	
PART I: REFEREN	CE SPECIAL INSPECTION REPORT NO.		(Attach copy of report.
	NON-CONFORMANCE: (PROVIDE ATTACHMENTS IF NECESSAR	XY)	
RDP SIGNATURE_		_DATE	
IS REINSPECTION	BY SPECIAL INSPECTOR REQUIRED	YES	NO
or Construction M RDP.)	CTOR VERIFICATION (To be completed by lanager] or Subcontractor and returned to the date listed, the non-conforming item noted	ne Special In	spector and the
SIGNATURE	DA	TE	

SECTION 014219 - REFERENCE STANDARDS

1.1 QUALITY ASSURANCE

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.
- C. Conflicting Requirements: Where compliance with two or more standards is specified, and the standards may establish different or conflicting requirements for minimum quantities or quality levels comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- 1.2 REFERENCE STANDARDS The abbreviations, which may be used in the construction specifications, refer to the organizations and specifications of the organizations listed below.

ASC Associated Air Balance Council AI Asphalt Institute AISC American Institute of Steel Construction ADC Air Diffusion Council ALSC American Lumber Standards Committee AMCA Air Movement and Control Association ARMA Asphalt Roofing Manufacturers Association ASC Adhesive and Sealant Council ASLA American Society of Landscape Architects ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. ASTM American Society for Testing and Materials International CLFMI Chain Link Fence Manufacturers Institute CRI Carpet and Rug Institute CS Commercial Standard of NBS FS Federal Specifications (General Services Administration), Specifications Unit (WFSIS) GANA Glass Association of North America GS Green Seal IEEE Institute of Electrical and Electronics Engineers IESNA Illuminating Engineering Society of North America IGMA Insulating Glass Manufacturers Alliance LSGA Laminators Safety Glass Association MFMA Maple Flooring Manufacturers Association MFMA Maple Flooring Manufacturers Association NFPA National Fenestration Rating Council NHLA National Fenestration Rating Council NHLA National Paint and Coatings Association NPCA National Particleboard Association NPCA National Paint and Coatings Association	A A D.O.	
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NPCA National Paint and Coatings Association NPA National Particleboard Association	NOFMA	National Oak Flooring Manufacturers Association
NPA National Particleboard Association	NPCA	
NSF National Sanitation Foundation International	NPA	National Particleboard Association
	NSF	National Sanitation Foundation International

NTMA	The National Terrazzo and Mosaic Association
RFCI	Resilient Floor Covering Institute
SFPA	Southern Forest Products Association
SIGMA	Sealed Insulating Glass Manufacturers Association
SPC	Southern Pine Inspection Bureau (Grading Rules)
SSPC	Steel Structures Painting Council
WDMA	Window & Door Manufacturers Association
WMMP	Wood Moulding and Millwork Producers Association
WRI	Wire Reinforcement Institute, Inc.
WSFI	Wood and Synthetic Flooring Institute
WWPA	Woven Wire Products Association

B. Federal Agencies

CE	Army Corps of Engineers)
CPC	Consumer Product Safety Commission
EPA	Environmental Protection Agency
DOE	Department of Energy
NIST	National Institute of Standards and Technology
OSHA	Occupational Safety & Health Administration

Further attention is directed to industry guide complied by Sweet's division of McGraw-Hill denoted as "PROJECT INFORMATION AND SERVICES" as well as in the web site www.4specs.com wherein a comprehensive list of international organizations representing building product manufacturers, associations, institutes, governmental agencies and testing bureaus is put forth.

- 1.3 APPLICABLE CODES: The following is a listing of applicable codes within the jurisdiction of the Work:
 - A. IBC: 2020 International Building Code
 - B. IFC: 2020 International Fire Code
 - C. IMC: 2020 International Mechanical Code
 - D. IPC: 2020 International Plumbing Code
 - E. IGC: 2020 International Fuel Gas Code
 - F. IEBC: 2020 International Existing Building Code
 - G. IECC: 2020 International Energy Conservation Code
 - H. MPS: 1998 Manual of Planning Standards
 - I. 115: 8 NYCRR 155 Regulations of the Commissioner of Education

End of Section

SECTION 015000 - TEMPORARY FACILITIES & CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Water service and distribution.
 - 2. Temporary electric power and light.
 - 3. Temporary heat.
 - 4. Ventilation.
 - 5. Telephone service.
 - 6. Sanitary facilities, including drinking water.
 - 7. Storm and sanitary sewer.
- C. Support facilities include, but are not limited to, the following:
 - 1. Field offices and storage sheds.
 - 2. Architects/Engineers field office.
 - 3. Temporary roads and paving.
 - 4. Dewatering facilities and drains.
 - 5. Temporary enclosures.
 - 6. Hoists and temporary elevator use.
 - 7. Temporary project identification signs and bulletin boards.
 - 8. Waste disposal services.
 - 9. Rodent and pest control.
 - 10. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Temporary fire protection.
 - 2. Barricades, warning signs, and lights.
 - 3. Environmental protection.
 - 4. Tree and plant protection.
 - 5. Pest control.
 - 6. Security enclosure and lockup.
 - 7. Temporary enclosures.
 - 8. Temporary partitions.

1.2 DIVISION OF RESPONSIBILITIES

A. General: Contractor is specifically assigned certain responsibilities for temporary services and facilities to be used by other Contractors, and other nonprime contractors and separate entities at the site, Owner's workforces, Construction Manager, Architect, testing agencies, personnel of governing authorities, and personnel authorized to be at project site during contract time. The Contractor is responsible for providing temporary facilities and controls that are not normal construction activities of other Contractors and are not specifically assigned otherwise by the Contract Documents.

1.3 USE CHARGES

- A. General: Cost or use charges for temporary facilities are not chargeable to the Owner or the Architect. The Architect will not accept a Contractor's cost or use charges for temporary services or facilities as a basis of claim for an adjustment in the Contract Sum or the Contract Time.
- B. Water Service: Use water from the Owner's existing water system without metering and without payment of use charges if available. If not available, the contractor needing water must supply water required for the performance of their work.
- C. Electric Power Service: Temporary electric power including set-up, maintenance and potential use charges is the responsibility of the Contractor.
 - 1. Use of electric power from the Owner's permanent power system (when operational) will be granted to all Contractors without payment of use charges.
 - 2. The Contractor is to supply power to all job trailers including the construction manager's job trailer.
 - Subpanels and sub-feeds to ancillary panels will be provided by and connected to permanent panels by the Contractor. Follow all OSHA and NFPA requirements for temporary connections. All panel penetrations shall be patched per approved NFPA regulations.

1.4 SUBMITTALS

- A. Temporary Utilities: The Contractor shall submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.
- B. Implementation and Termination Schedule: Within 15 days of the date established for submittal of the Contractor's Construction Schedule, each Contractor shall submit a schedule indicating implementation and termination of each temporary utility for which the Contractor is responsible.
- C. Temporary Signage: Provide shop drawings indicating the size and layout of the signs, color choices for Owner selection and installation details. Temporary site signage is by Contractor.

1.5 QUALITY ASSURANCE

- A. Regulations: The Contractor shall comply with industry standards and with applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
 - 1. Building code requirements.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police, fire department and rescue squad rules.
 - Environmental protection regulations.
- B. Standards: The Contractor shall comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."
 - 1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with the normal application of trade regulations and union jurisdictions.

- 2. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. Temporary Utilities: The Contractor shall prepare a schedule indicating dates for implementation and termination of each temporary utility for which the Contractor is responsible. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.
 - Temporary Use of Permanent Facilities: The Installer of each permanent service shall assume responsibility for its operation, maintenance, and protection during use as a construction facility prior to the Owner's acceptance, regardless of previously assigned responsibilities.
- 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-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: The Contractor shall provide new materials. If acceptable to the Architect, undamaged, previously used materials in serviceable condition may be used. Provide materials suitable for use intended.
- B. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry."
 - 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-type, Grade B-B high-density concrete form overlay plywood of sizes and thicknesses indicated.
 - 3. For fences and 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.
- C. Pavement: Comply with Division 2 Pavement Sections
- D. Insulation: Unfaced mineral-fiber blanket manufactured from glass, slag wool, or rock wool; with maximum flame spread and smoke developed indices of 25 and 50, respectively.
- E. Gypsum Wallboard: Provide gypsum wallboard on interior walls of temporary offices.
- F. Roofing Materials: Provide UL Class A standard-weight asphalt shingles or UL Class C mineral-surfaced roll roofing on roofs of job-built temporary offices, shops, and sheds.
- G. Paint: Comply with requirements of Division 9 Section "Painting."

- 1. For job-built temporary offices, shops, sheds, fences, and other exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.
- 2. For sign panels and applied graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
- 3. For interior walls of temporary offices, provide 2 coats interior latex-flat wall paint.
- H. 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.
- I. Water: Provide potable water approved by local health authorities.
- J. Open-Mesh Fencing: Provide 0.12-inch- thick, galvanized 2-inch chainlink fabric fencing 6 feet high with galvanized barbed-wire top strand and galvanized steel pipe posts, 1-1/2 inches I.D. for line posts and 2-1/2 inches I.D. for corner posts.

2.2 EQUIPMENT

- A. General: The Contractor shall provide new equipment. If acceptable to the Architect, undamaged, previously used equipment in serviceable condition may be used. 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.
- C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- E. Lamps and Light Fixtures: Provide general service led or incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
- G. Temporary Offices: The Contractor shall provide its own prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.
- H. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- I. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.

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

3.1 TEMPORARY UTILITY INSTALLATION

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
 - 1. Arrange with the company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
 - 3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.
- B. Water Service: All Contractors shall provide and maintain temporary water service and distribution for the scope of their work. Piping of sizes and pressures adequate for construction and hose bibs on site as to provide service to all areas of construction activities as directed by the Architect, as required throughout the construction period.
 - 1. Water service shall be potable and modified as required or as directed by the Architect, as Work progressed.
 - a. Sterilization: Sterilize temporary water piping prior to use.
 - Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
 - 3. Drinking Water Facilities: Provide bottled water to employees.
 - The Contractor shall provide containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
 - 4. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel where applicable by OSHA.
 - 5. Users shall provide their own hoses to points of need, but shall practice prudent conservation.
- C. Temporary Electric Power Service: The Contractor shall provide and maintain temporary electric service consisting of main power hook-up and panel board and temporary lighting for site and existing building. Temporary service shall be maintained during all work days and shall comply with all codes and regulations. The system shall be modified as required or as directed by the Construction Manager as work progresses. Each . tractor shall provide power distribution for its own use from EC's panel.
 - Electrical service:
 - Obtain temporary service from existing building service or local power pole. If practical, power to each location shall be tapped at transformer vault or main distribution panel, ahead of main breakers to minimize demand on service equipment from operations. Over-current protection shall be installed as required.
 - Provide disconnect at connection to service.
 - 3. Provide service conductors and equipment.
 - 4. Minimum power characteristics: 240/120 volt, single phase.
 - 5. Provide distribution equipment, feeders, and branch circuit panelboards to serve:

- a. Temporary lighting.
- Temporary convenience receptacles. (4 gang outlet boxes to allow for 50' extension cord; enough to accommodate requirements of the entire building)
- c. To accommodate construction operations requiring power, use of power tools, electric heating and start up testing of permanent electric powered equipment prior to its permanent connection to electrical system.
- 6. Each Contractor shall provide his own extension lines, and other special equipment; welding equipment shall run from generator trucks. If permissible and with prior coordination, Contractor shall install welding leads from panels for construction use
- 7. The Contract shall be responsible for initial connections and final demolition of all temporary fixtures and wiring at direction of the Construction Manager.
- 8. The Contract shall maintain OSHA standards for power and foot candle levels in all areas while workers occupy the space. The temporary lighting shall be energized daily from 6:30 A.M. to 4:30 P.M. as a minimum duration until permanent fixtures are installed.
- Not unlike other equipment in this contract, upon installation, the temporary electric system becomes the property of the Owner and shall not be controlled by any one contractor.
- 10. Temporary Site Lighting: The Contract to maintain existing exterior Lighting to adequately light the entrances and exits of project site. Temporary lighting shall be controlled by time clocks and lighting contactors; settings to be coordinated by the Construction Manager.
- 11. Each Contractor will be responsible for hookup of their own project trailers to temporary electric pedestal. If abused, power from temporary service will be disconnected. The Electric Contractor shall erect poles safely sufficient for site power and telephone service. All installations shall conform to the strictest standards. The Electric Contractor shall disconnect all items upon project completion.
- 12. Provide and install temporary power to abatement contractor's equipment as required up to the Abatement Contractor provided sub/supply panel.
- D. Temporary Telephones: Each Contractor shall provide temporary telephone service throughout the construction period for all personnel engaged in construction activities.
 - Contractors are required to lease or purchase a cellular telephone to be used by their site superintendents for communication with the other primes and the Architect.
 - 2. Provide telephone lines for the following, if so directed:
 - Provide a dedicated telephone line for a fax machine in each contractor's field office.
 - b. At each telephone, post a list of important telephone numbers.
- E. Sanitary Facilities: The Contractor shall provide temporary portable chemical toilet facilities for all construction personnel. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
 - 1. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.
 - 2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.
 - a. Provide separate facilities for male and female personnel.

F. Temporary Construction:

- 1. Temporary bridging, decks, hoists, lifts, scaffolding, and cranes shall be the responsibility of Contractor requiring same.
- 2. Provide temporary partitions to separate construction areas from adjacent occupied areas. Construct partitions with non-combustible materials or fire-retardant plywood and seal seams and gaps to control transmission of dust to occupied areas. After completion of work, remove partitions and restore surfaces damaged by temporary provisions. This work is the responsibility of the Contractor where applicable. Install temporary walls, zip walls, partition walls to separate Construction activities as directed from the Construction Manager
- 3. Temporary entrances and exits to the building shall be furnished, installed and maintained under the Contractor as directed by the Construction Manager. Exits shall be maintained for exiting in emergency conditions until permanent structures are in place.
- 4. Temporary entrances and exits to the site shall be furnished, installed and maintained under the Contractor as directed by the Construction Manager. Barrels, cones and other visual devices shall be used at all elevation changes subject to vehicle traffic. Fences, snow fences and NOT caution tape will be used to separate public from equipment, elevation hazards

G. Daily cleanup

- Dumpsters are to be provided by each contractor for the performance of their own work. Dumpsters will be inspected to assure they are not misused and removed and hauled to a recycling center off site for processing. NEITHER THE OWNER NOR THE CONSTRUCTION MANAGER will not be responsible for the removal of any hazardous materials, this will be the responsibility of the Contractor performing this scope.
- 2. The maintenance of a clean work site shall be the responsibility of each Contractor.
- 3. Each Contractor shall remove own debris daily from work area to waste disposal containers (dumpsters), time lapse not acceptable.
- 4. The condition of cleanliness in which an area is found is the condition each Contractor shall leave.
- Each and every Contractor working on site shall provide manpower on Friday at 8 A.M. to work as a team to remove debris to dumpsters until complete. At discretion of Construction Manager, a Contractor not complying may be back charged for work performed by others. The responsibility of broom cleaning and debris disposal remains with each trade for their work and shall include use of sweeping compound.
- 6. Final cleaning shall be the responsibility of each Contractor for his/her own work.
- 7. The Contractor shall handle all construction site snow removal as needed for work area safety or as directed by the Construction Manager.
- 8. Protection of Work: Each Contractor is reminded to temporarily protect work in place until accepted by the Owner per Article 10 of the General Conditions of the Contract.

9. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 3 days during normal weather or 1 day when the temperature is expected to rise above 80°F (27°C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully. First aid requirements are the responsibility of each Contractor. Retain paragraph above where potable water is accessible from permanent or temporary lines. Where potable water is not available, retain paragraph below.

3.2 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. The Contractor shall provide each facility ready for use when needed to avoid delay.

 Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. The Contractor will be responsible for hookup of their own project trailers. Use of energy, including heat (shall be set back at night) if practical, electric service will be available. If abused, power from temporary service will be disconnected. All installations shall conform to the strictest standards.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Each Contractor is to have a field office. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access as directed by the Construction Manager.
 - Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
- B. Provide incombustible construction for offices, shops, and sheds located within the construction area or within 30 feet of building lines. Comply with requirements of NFPA 241.
- C. Field Offices: Each Contractor shall provide an insulated, weathertight temporary office of sufficient size to accommodate required office personnel at the Project Site. Keep the office clean and orderly for use for small meetings. Furnish and equip offices as follows:
 - 1. Furniture: Furnish with a desk and chairs, a 2-drawer file cabinet, plan table, plan rack, and a bookcase.
 - 2. Equip with a water cooler and private toilet complete with water closet, lavatory, and medicine cabinet unit with a mirror.
- D. Storage and Fabrication Sheds: Install storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on-site.
- E. Temporary Parking/Staging and Access Roads
 - 1. Temporary roads are installed and/or maintained by the Contractor where designated on-site logistics plans.

- 2. Contractors will be permitted to utilize existing roads, as designated (as segregated by the Owner if required).
- 3. Road Cleaning: Maintain roads and walkways in an acceptably clean condition. This includes the removal of debris daily, if required, and/or a minimum of once a week due to all project traffic. Road cleaning equipment to be wet/vacuum type. The Contractor will clean the roads affected by all contract work. The Contractor will maintain roads until project completion.
- 4. Contractor Parking/ Staging Area: Contractor shall maintain access for suitable parking areas as indicated on Logistics plans. Re-grade, re-seed and restore any areas disturbed by parking/ staging.
 - a. Parking Areas: Includes contractors' employees and construction vehicle parking. Minimum of 6" reference Item. #304.3 course.
 - b. Access Roads: Includes access roads for delivery through staging area to building work areas, and to equipment and storage areas and sheds. Minimum of 9" reference Item. #304.3 course.
- 5. Temporary parking by construction personnel shall be allowed only in areas so designated.
- 6. Traffic Regulations:
 - a. Utilize only entrances/temporary roads as designated
 - b. Construction parking will not be allowed adjacent to residential buildings, additions or monuments.
- 7. Traffic Controls: The 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. Comply with requirements of authorities having jurisdiction. A site traffic plan and protection will be submitted and approved to the Construction Manager prior to the start of construction. Plans shall include but not limited to vehicle division and protection, pedestrian division and protection, weekend plans, inclement weather plan, signage.
- F. De-watering Facilities and Drains:
 - For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, use the same facilities. Maintain the site, excavations, and construction free of water.
 - 2. For temporary drainage and de-watering facilities and operations directly associated with the building and other construction activities, comply with Division 2; Contractor is directly responsible for de-watering of all excavations.
- G. Temporary Enclosures: The Contract shall provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations, and similar activities as follows unless otherwise noted:
 - 1. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 sq. ft. (2.3 sq. m) or less with plywood of similar materials.
 - 2. Close openings through floor decks and horizontal surfaces with load bearing, wood-framed construction.
 - Where temporary wood or plywood enclosure exceeds 100 sq. ft. (9.2 sq. m) in area, use UL-labeled, fire-retardant treated material for framing and main sheathing.

- 4. Generally, temporary closures for specific openings for a Contractor to perform their work openings are the responsibility of Contractor creating the opening and shall be installed to protect building from exterior elements.
- 5. Temporary partitions shall be installed at all openings where additions connect to existing buildings, and where required to protect areas, spaces, property, personnel, students, and faculty; to separate and control dust, debris, noise, access, sight, fire areas, safety and security and to separate phased construction areas per the phasing plan. Temporary partitions shall be installed and maintained. Construction material and methods to suit need as determined by Construction Manager.
- 6. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- H. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors as follows (per site): The Contractor shall furnish and install construction signage as required:
 - a. Engage an experienced sign painter to apply graphics. Comply with details indicated.
 - b. For construction traffic control/flow at entrances/exits, as designated by the Owner (3 required)
 - c. To direct visitors (2 required)
 - d. For construction parking (2 required)
 - e. To direct deliveries (2 required)
 - f. For warning signs as required
 - g. Per OSHA standards as necessary
 - h. For trailer identification
 - i. Temporary exit signs
- I. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Operations of the Contractor may not block, hinder, impede, or otherwise inhibit the safe and expeditious exiting of the building's occupants during an emergency.
- B. 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.
- C. Temporary Facility Changeover: Except for using permanent fire protection as soon as available, do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Architect.

- D. Temporary Fire Protection: Contractor shall provide, until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10, "Standard for Portable Fire Extinguishers," and NFPA 241, "Standard for Safeguarding Construction, Alterations, and Demolition Operations."
 - Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
 - Store combustible materials in containers in fire-safe locations.
 - 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fireprotection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
 - 4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
 - 5. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

E. Fall Protection:

- The Roofing Work Contractor shall provide temporary cable top & mid railings per OSHA regulations around mechanical floor openings. Most of the exterior can be done by running cables from column to column, but some areas may require you to install posts as well. Include toe boards around perimeter and openings where required. The Contractor must provide his own means for providing OSHA approved fall protection for his work persons. Temporary railings removed by a Contractor for some reason other than constructing the permanent wall, must be immediately replaced by that Contractor.
- 2. The Roofing Work Contractor shall rope off all roof openings in an OSHA approved manner. Include fluorescent ribbons or flags to accent the ropes
- F. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- G. Enclosure Fence: The Contractor shall install an enclosure fence at work and storage areas with lockable entrance gates. Locate where indicated, or as directed by the Construction Manager determined to be sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the enclosed area, except by the entrance gates.
 - 1. Provide open-mesh, 8-foot high chainlink fencing with posts at 8-feet on center, set in a compacted mixture of gravel and earth. Snow fences shall not be used to protect pedestrians from the work or storage spaces.
 - 2. Provide min. 3 double swing access gates and man gates. Each gate is to have a chain and padlock.
 - a. Provide (2) keys for each lock to the Construction Manager.
 - Remove fence upon completion of activities or sooner if directed by Architect.
- H. Security Enclosure and Lockup: The Contractor shall install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.

- 1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- I. Environmental Protection: 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 using 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.
- 3.5 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 and good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
 - Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
 - 2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and Removal: Unless the Construction Manager requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - Materials and facilities that constitute temporary facilities are the property of each prime contractor. The Owner reserves the right to take possession of project identification signs.
 - 2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.
 - 3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
 - a. Replace air filters and clean inside of ductwork and housings.
 - b. Replace significantly worn parts and parts subject to unusual operating conditions.
 - c. Replace lamps burned out or noticeably dimmed by hours of use.

END OF SECTION 015000

SECTION 015719 - ENVIRONMENTAL PROTECTION DURING CONSTRUCTION

PART 1 - GENERAL

1.1 GENERAL

- A. Requirements set forth herein are in addition to and shall be considered as complementary to the General Conditions to the Contract and the balance of Division #1 and Technical Specifications.
- B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.

1.2 REQUIREMENTS INCLUDED

- A. Scope
- B. Applicable Regulations
- C. Notification
- D. Implementation
- E. Protection of Land Resources
- F. Recording and Preserving Historical and Archaeological Finds
- G. Protection of Water Resources
- H. Burning
- I. Dust and Mud Control
- J. Maintenance of Pollution Control Facilities During Construction

1.3 SCOPE

A. The work covered by this section consists of furnishing all labor, material and equipment and performing all work required for the prevention of environmental pollution during and as the result of construction operations under this contract except for those measures set forth in other Technical Provisions of these specifications.

For the purpose of this specification environmental pollution is defined by regulatory authorities as the presence of chemical, physical or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and recreational purposes.

The control of environmental pollution requires consideration of air, water and land, and involves noise, solid waste-management and management of radiant energy and radioactive materials, as well as other pollutants.

B. Compliance with the provisions of this section by all Subcontractors shall be the responsibility of the Contractor.

1.4 APPLICABLE REGULATIONS

A. In order to provide for abatement and control of any environmental pollution arising from the construction activities of the Contractor and his subcontractors in the performance of this contract, they shall comply with all

applicable Federal, State and local laws, and regulations concerning environmental pollution control and abatement as well as the specific requirements stated elsewhere in the contract specifications.

1.5 NOTIFICATION

A. The Architect will notify the Contractor in writing of any non-compliance with the foregoing provisions. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the Architect may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost on account of any such stop orders shall be made the subject of a claim for extension of time or for extra costs or damages by the Contractor unless it was later determined that the Contractor was in compliance.

1.6 PROTECTION OF LAND RESOURCES

- A. It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this contract be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the project. Insofar as possible, the Contractor shall confine his construction activities to areas defined by the plans or specifications.
- B. The following additional requirements are intended to supplement and clarify the requirements contained in the General Conditions.

The location on the project site of the Contractor's storage and other construction buildings, required temporarily in the performance of the work, shall be upon assigned portions of the job site and shall require written approval of the Architect.

The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the overall construction of buildings.

Plans showing storage and office facilities shall be submitted for approval of the Architect.

- C. If the Contractor proposes or is required to construct temporary roads or embankments and excavations for plant and/or work areas, he shall submit the following for approval at least 21 days prior to scheduled start of such temporary work.
 - 1. A layout of all temporary access roads, excavations and embankments to be constructed with the work area.
 - 2. Plans and cross sections of proposed embankments and their foundations, including a description of proposed materials.

1.7 RECORDING AND PRESERVING HISTORICAL AND ARCHAEOLOGICAL FINDS

A. All items having any apparent historical or archaeological interest which are

discovered in the course of any construction activities shall be carefully preserved. The Contractor shall leave the archaeological find undisturbed and shall immediately report the find to the Architect so that the proper authorities may be notified.

1.8 PROTECTION OF WATER RESOURCES

- A. The Contractor shall not pollute streams, lakes, reservoirs or public waters with fuels, oils, bitumens, calcium chloride, acids or harmful materials. It is the responsibility of the Contractor to investigate and comply with all applicable Federal, State, County and Municipal laws concerning pollution of surrounding public waters. All work under this contract shall be performed in such a manner that objectionable conditions will not be created in public waters through or adjacent to the project areas.
- B. Prior to any major construction the Contractor shall submit a plan for approval by the Architect showing his scheme for controlling erosion and disposing of waste.
- C. Surface drainage from cuts and fills within the construction limits, whether or not completed, and from borrow and waste disposal areas, shall, if turbidity producing materials are present, be held in suitable sedimentation ponds or shall be graded to control erosion within acceptable limits.

Temporary erosion and sediment control measures such as berms, dikes, drains, or sedimentation basins, if required to meet the above standards, shall be provided until permanent drainage and erosion control facilities are completed and operative.

Fills and waste areas shall be constructed by selecting placement to eliminate silts or clays on the surface that will erode and contaminate adjacent public waters.

- D. At all times of the year, special measures shall be taken to prevent chemicals, fuels, oils, grease, bituminous materials, waste washings, herbicides and insecticides, and cement and surface drainage from entering public waters
- E. Disposal of any materials, wastes, effluents, trash, garbage, oil, grease, chemicals, etc., in areas adjacent to public waters shall be subject to the approval of the Architect. If any waste material is dumped in unauthorized areas the Contractor shall remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, contaminated ground shall be excavated, disposed of as directed by the Architect, refilled with clean material and compacted all at the expense of the Contractor.

1.9 BURNING

A. Burning will not be permitted.

1.10 DUST AND MUD CONTROL

A. The Contractor shall at all times provide adequate dust control measures. He shall accomplish this, without interference to the public and vehicular transportation.

- B. To control dust, it is required that all vehicles transporting dust producing materials to and from the job shall be covered with tarpaulins securely tied down, be sprinkled when necessary or be satisfactorily treated by other approved methods.
- C. Trucks leaving excavations shall be water washed prior to entry on access roads or public streets to remove mud and other deleterious substances from wheels and undercarriages.
- D. All public and private ways adjacent to the site shall be broomed and flushed whenever necessary in the opinion of the Architect. Drainage systems shall be cleaned and flushed whenever mud or debris hinders the flow of storm water to or in the sewers.
- E. The Contractor shall immediately remove refuse, rubbish, debris and soil accumulations on roads, streets and on sidewalks, caused by wind, rain and snow erosions or by his own operations to prevent traffic hazards or interference with road drainage.

1.11 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

A. During the life of this contract the Contractor shall maintain all facilities constructed for pollution control under this contract as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created. During the construction period the Contractor shall conduct frequent training courses for his maintenance personnel. The curriculum shall include methods of detection of pollution, familiarity with pollution standards, and installation and care of vegetation covers, plants and other facilities to prevent and correct environmental pollution.

End of Section

SECTION 016100 - MATERIAL AND EQUIPMENT

1.1 GENERAL

- A. Requirements set forth herein are in addition to and shall be considered as complementary to the General Conditions and the balance of Division #1 and Technical Specifications.
- B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.

1.2 REQUIREMENTS INCLUDED

- A. General Standards
- B. Products
- C. Sustainability
- D. Transportation and Handling
- E. Storage and Protection

1.3 GENERAL STANDARDS APPLICABLE TO ALL SPECIFICATION SECTIONS

- A. These provisions, standards, and tolerances shall apply to all work under this Contract. Where stricter standards and tolerances are specified elsewhere in these Specifications or in references specified in these Specifications, they shall take precedence over these standards and tolerances.
- B. Build and install parts of the Work level, plumb, square, and in correct position unless specifically shown or specified otherwise.
 - 1. No part shall be out of plumb, level, square, or correct position so much as to impair the proper functioning of the part or the Work as judged by the Architect.
 - No part shall be out of plumb, level, square, or correct position so much as to impair the aesthetic effect of the part or the Work as judged by the Architect.
- C. Make joints tight and neat. Provide uniform joints in exposed work. Arrange joints to achieve the best visual effect. Refer choices of questionable visual effect to the Architect.
- D. Under potentially damp conditions, provide galvanic insulation between different metals which are not adjacent on the galvanic scale.
- E. Manufacturers, subcontractors, and workmen shall be experienced and skillful in performing the work assigned to them.
- F. All paint used on all products shall conform to ANSI Z66.1, Specifications for Paints and Coatings Accessible to Children to Minimize Dry Film Toxicity.
- G. The Drawings do not attempt to show every item of existing work to be demolished and every item of repair required to existing surfaces. Perform work required to remove existing materials which are not to be saved and to restore existing surfaces to condition equivalent to new as judged by Architect. If possible, repairs shall be indistinguishable from adjacent sound surfaces. Where it is impossible to achieve repairs, which are indistinguishable from adjacent sound surfaces to remain, notify Architect in writing, and proceed according to his instructions.

1.4 PRODUCTS

- A. Products include material, equipment and systems.
- B. Comply with Specifications and referenced standards as minimum requirements.
- C. Components required to be supplied in quantity within a Specification Section shall be the same and shall be interchangeable.
- D. In the case of an inconsistency between Drawings and the Specifications, or within either document which is not clarified by addendum, the product of greater quality or greater quantity of work shall be provided in accordance with the Designer's interpretation.
- E. Provide environmentally preferable products to the greatest extent possible. To the greatest extent possible, provide products and materials that have a lesser or reduced effect on the environment considering raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and/or disposal of the product.

1.5 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based
 - 2. Water-soluble
 - 3. Can be cleaned up with water
 - 4. Non-flammable
 - 5. Biodegradable
 - 6. Low or preferably no Volatile Organic Compound (VOC) content
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere
 - 9. Do not contain methylene-chloride
 - 10. Do not contain chlorinated hydrocarbons
 - 11. Contains the least possible of post-consumer or post- industrial waste

1.6 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of materials in accordance with construction schedules in order to avoid delay in, conflict with, or the impeding of the progress of the Work and conditions at the site. Deliveries shall be made during regular work hours, unless approved otherwise by the Owner.
- B. Deliver materials in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

1.7 STORAGE AND PROTECTION

A. Store materials in accordance with manufacturer's instructions, with seals and labels accessible for inspection.

Contractor shall be responsible for work and equipment until fully inspected, tested and accepted. Carefully store materials and equipment which are not immediately installed after delivery to site. Close open ends of work with temporary covers or plug during construction to prevent entry of obstructing material or damaging water.

- B. Materials stored on the Site shall be neatly arranged and protected and shall be stored in an orderly fashion in locations that shall not interfere with the progress of the Work or with the operations of the Owner.
- C. Interior Storage: Maintain temperature and humidity within the ranges required by manufacturer's instructions.

<u>NOTE</u> - Should it become necessary during the course of the Work to move materials or equipment stored on the Site, the Contractor, at the direction of the Architect, shall move such material or equipment.

D. Protection After Installation

- 1. Provide adequate coverings to protect installed materials from damage resulting from natural elements, traffic, and subsequent construction.
- 2. Remove when no longer needed.

End of Section

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 GENERAL

- A. Requirements set forth herein are in addition to and shall be considered as complementary to the General Conditions of the Contract and the balance of Division #1 and Technical Specifications.
- B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.
- C. Definitions as apply to "Contractors" involved with the work of this Project shall be as set forth in Section 10 10 00, Article 1.01
- D. Any and all "Waste Handlers and Haulers" shall be licensed by the Authority having jurisdiction over "Solid Waste Management" and a copy of said license shall be submitted in accordance with Article 1.05 herein.

1.2 DESCRIPTION OF WORK

A. This Section specifies requirements for a complete program for implementation of waste management controls and systems for the duration of the Work.

1.3 INTENT

- A. The Owner has established that this Project shall generate the least amount of waste practical and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors shall be employed.
- B. Of the waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized to the greatest extent practical. With regard to these goals each Contractor shall develop, for Owner's Representative's review and Architect's review, a Waste Management Plan for this Project. Contractor shall be responsible for segregating his/her waste into different dumpsters. Contractor shall be responsible for ensuring that debris will be disposed of at appropriately designated licensed solid waste disposal facilities, as defined by governing laws of the jurisdiction of the Work.

1.4 WASTE MANAGEMENT PLAN

- A. Waste Management Plan: Contractor shall provide a plan containing the following:
 - 1. Analysis of the proposed jobsite waste to be generated, including types and rough quantities.
 - 2. Landfill Options: The name of the landfills where trash and building debris will be disposed of, the applicable landfill tipping fees, and the projected cost of disposing of all Project waste in the landfills.
 - 3. Landfill Certification: Contractor's statement of verification that landfills proposed for use are licensed for types of waste to be deposited and have sufficient capacity to receive waste from this project.

- 4. Alternatives to Landfilling: A list of each material proposed to be salvaged or recycled during the course of the Project. Include the following and any additional items proposed:
 - a. Cardboard
 - b. Clean dimensional wood
 - c. Beverage containers
 - d. Concrete
 - e. Bricks and masonry
 - f. Asphalt
 - g. Metals from framing, banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze
 - h. Glass, colored glass allowed
 - i. Plastic
 - 1. Type 1: Polyethylene Terephthalate (PET, PETE)
 - 2. Type 2: High Density Polyethylene (HDPE)
 - 3. Type 3: Vinyl (Polyvinyl Chloride or PVC)
 - 4. Type 4: Low Density Polyethylene (LDPE)
 - 5. Type 5: Polypropylene (PP)
 - 6. Type 6: Polystyrene (PS)
 - 7. Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above or is made of more than one resin listed above and used in a multi-layer combination.
 - j. Paint and paint cans
 - k. Insulation
 - Others as appropriate
- 5. Meetings: A description of the regular meetings to be held to address waste management.
- 6. Materials Handling Procedures: A description of the means by which any waste materials identified above will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.
- 7. Transportation: A description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site) and destination of materials.

1.5 SUBMITTALS

- A. Construction Waste Management Plan: Submit 3 copies of plan within 21 days of date established for the Notice to Proceed.
- B. Calculations and supporting documentation to demonstrate end-of- project recycling rates meeting the requirements for Construction Waste Management Plan of Item above.
- C. For materials separated for recycling off-site, establish a method for tracking the weight of the recycled material. The method shall be included in the CWM

- Plan for the Architect's review and approval.
- D. Waste Reduction Progress Reports: Concurrent with the Applications for Payment, submit three copies of report. Include monthly tabulations for demolition and construction waste sent off-site for disposal or recycling.
- E. Waste haulers solid waste management license.

PART 2 - PRODUCTS_- NOT USED

PART 3 - EXECUTION

3.1 RECYCLING

- A. Metal, including but not limited to aluminum stairs, structural beams and sections, and reinforcing steel shall be recycled.
- B. Wood that is not painted and does not contain preservatives (i.e. creosote, arsenic, and chromium-containing preservatives) shall be segregated and recycled.

3.2 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. All sorting will be done "off-site" by a recognized construction and demolition processing facility who will be responsible for provision of all documentation as to where loads were processed, and the recycling rate achieved.
- B. Hazardous Wastes: Any unforeseen hazardous wastes shall be separated, stored, and disposed of according to local regulations.

End of Section

SECTION 017700 - PROJECT CLOSE OUT

1.1 GENERAL

- A. Requirements set forth herein are in addition to and shall be considered as complementary to the General Conditions and the balance of Division #1 and Technical Specifications.
- B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.

1.2 REQUIREMENTS INCLUDED

- A. Final Cleanup
- B. Required Close Out Documentation
- C. Project Close Out Inspections

1.3 FINAL CLEANUP

- A. The Contractor shall leave the work ready for use and occupancy without the need of further cleaning of any kind.
- B. The Contractor shall remove all tools, appliances, project signs, material and equipment from the phased areas as soon as possible upon completion of the work.
- C. The work is to be turned over to the Owner in new condition, in proper repair and in perfect adjustment to the satisfactions of the Owner.

1.4 REQUIRED CLOSE OUT DOCUMENTATION

- A. Prior to final payment the Owner shall receive, in addition to those documents required by the General Conditions, the following:
 - 1. Project record documents as per Section 01 77 19
 - 2. The Contractor's general guarantees
 - 3. Specific guarantees of material, equipment and systems installed in the work. A copy of all test data taken in connection with the work.
 - 4. Copies of all Certification of Specifications Compliance as per Section 01 33 00
 - 5. Record of Material Safety Data Sheets (MSDS)
 - 6. Certified Payroll Records

1.5 PROJECT CLOSE OUT INSPECTIONS

- A. When the Work has reached such a point of completion that the building or buildings, equipment, apparatus or phase of construction or any part thereof required by the Owner for occupancy or use can be so occupied and used for the purpose intended, the Contractor, prior to notification to the Architect, shall make a preliminary inspection of the Work to insure that all the requirements of the Contract have been met and the Work is substantially complete and is acceptable. Upon such notification, the Architect shall make a detailed inspection of the Work to ensure that all the requirements of the Contract have been met and that the Work is complete and is acceptable.
- B. A copy of the report of the inspection shall be furnished to the Contractor as the inspection progresses so that the Contractor may proceed without delay

- with any part of the Work found to be incomplete or defective.
- C. When the items appearing on the report of inspection have been completed or corrected, the Contractor shall so advise the Architect. After receipt of this notification, the Architect shall inform the Contractor of the date and time of final inspection. A copy of the report of the final inspection containing all remaining contract exceptions, omissions and incompletions shall be furnished to the Contractor.
- D. After the receipt of notification of completion and all remaining contract exceptions, omissions and incompletions from the Contractor, the Architect will reinspect the Work to verify completion of the exception items appearing on the report of final inspection.
- E. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance or will furnish to the Contractor a copy of the report of the Architect's reinspection detailing Work that is incomplete or obligations that have not been fulfilled but are required for final acceptance.

End of Section

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SECTION 017719 - PROJECT RECORD DOCUMENTS

1.1 GENERAL

- A. Requirements set forth herein are in addition to and shall be considered as complementary to the General Conditions of the Contract and the balance of Division #1 and Technical Specifications.
- B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.
- C. Definitions as apply to "Contractors" involved with the work of this Project shall be as set forth in Section 01 10 00, Article 1.01.

1.2 REQUIREMENTS INCLUDED

- A. Project Record Drawings
- B. Record Drawing Certification

1.3 PROJECT RECORD DRAWINGS

A. The purpose of the project drawings is to record the actual location of the work in place including but not limited to underground lines, concealed piping within buildings, concealed valves and control equipment, and to record changes in the work.

In addition to the above, these drawings shall be "color-coded", by each trade, on a daily basis to indicate progress of the work. Color legend will be assigned by the Architect.

B. In addition to the sets of contract drawings that are required by the Contractor on the site to perform the work, the Contractor shall maintain, at the site, one (1) copy of all drawings, specifications and addenda that are part of the Contract as awarded.

Each of these documents should be clearly marked "Project Record Copy", maintained in a clean and neat condition available at all times for inspection by the Owner or the Architect, and shall not be used for any other purpose during the progress of the work.

C. Project Record Requirements

- 1. The Contractor shall mark up the "Project Record Copy" to show:
 - a. Approved changes in the work
 - b. Location of underground work and concealed work
 - c. Details not shown in the original Contract Documents
 - d. Any relocation of work including piping, conduits, ducts and the like
 - e. All changes in dimensions
 - f. All access doors and "tack" locations access points in accessible ceilings
 - g. Location of all plumbing, heating, ventilating, air conditioning or electrical assemblies, whether existing to remain or newly installed
 - h. Revisions to any electrical circuitry

- 2. Such information shall include, but shall not be limited to:
 - a. Footing depth in relation to finished grade elevations
 - b. Any change in floor elevations
 - c. Any structural changes
 - d. Any substitutions
 - e. Elevations and locations of all underground utilities, services, or structures referenced to permanent above ground structures or monuments
 - f. Designation of all utilities as to the size and use of such utilities
 - g. All invert elevations of manholes
 - h. The location of all utilities, services and appurtenances concealed in building structures that have been installed differently from that required by the Contract
 - i. Any and all approved change orders

and other such data as required by the Architect and/or Owner so as to establish a complete record of "As-Constructed" conditions.

- D. The Contractor shall keep the project record documents up-to-date from day to day as the work progresses. Appropriate documents are to be updated promptly and accurately; no work is to be permanently concealed until all required information has been recorded.
- E. The project record drawings are to be submitted by the Contractor to the Architect when all the work is completed and is approved by the Owner and the Architect before the Contractor may request final payment.

If the project record drawings as submitted are found to be unacceptable due to incompleteness or inaccurate information, the drawings shall be returned to the offending Contractor for corrective action and resubmitted for approval prior to the release of final payment.

FINAL PAYMENT IS CONTINGENT UPON PREPARATION OF FINAL PROJECT RECORD DRAWINGS ON A SET OF "PRINTS" and CAD DISKETTES IN "DXF" or "DWG" FORMAT AS APPROVED BY THE OWNER (A SET OF BASE DISKETTES WILL BE FURNISHED BY THE ARCHITECT) AND SUBMITTAL OF SAME TO THE OWNER, THROUGH THE ARCHITECT.

F. In addition to the drawings required as mentioned above, the Contractor shall submit a list of all approved Shop Drawings of the Work as installed.

From this list the Architect will select the drawings desired for permanent records. The Contractor shall furnish these in a bound set to the Owner as part of the closeout requirements.

1.4 RECORD DRAWING CERTIFICATION

- A. The record drawings required under the terms and conditions of this Section shall be reviewed and processed by each of the Prime Contractors as part of their overall contractual responsibility.
- B. This certification may be issued for individual trades or as a collective

Orange-Ulster BOCES Interior Alterations – Third Floor Regional Education Center at Arden Hill

document to cover the entire record drawing requirements of the project.

The format of this certification shall be as follows: These record draw	rings prepared by:
forreviewed by the undersigned and:	have been
Appear to be an accurate representation of the work inco project and are accepted as submitted in accordance with the tea	•
This record document review made by this office is for determination the requirements of the contract documents.	of compliance to
Firm Name:	
Review Date:By:	
End of Section	

SECTION 024100 - DEMOLITION

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all demolition work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:

Perform all required demolition work within existing structure to accommodate new program and use. Ensure adequate protective measures are taken to protect existing components to be retained against damage. Any and all damage will be corrected at no cost the Owner.

- 1. Provide all temporary shoring systems as necessary in conjunction with the removal and new opening operations including interior and exterior walls, roofs, floors and ceilings.
- 2. Perform saw cutting operations on existing concrete slabs to permit execution of work.
- 3. Strip existing applied finishes including floors, walls, bases and ceiling systems as required to permit execution of the work of this project.
- 4. Field verify and remove firestopping and spray fireproofing materials on structural columns, beams, and other surfaces as required for application of new spray applied fireproofing and installation of new construction.
- 5. Remove existing spray fireproofing and miscellaneous materials such as blocking, stud framing, tracks, clips, etc. from bottom flange of existing steel beams and prep for new spray fireproofing.
- 6. Remove existing partitions, doors, frames and the like from all areas designated, salvage doors, frames and hardware for reuse as scheduled and/or noted.
- 7. Protect all adjoining properties, site improvements and other amenities designated to remain from damage during the demolition operations required by the scope of work of this Project.
- 8. Perform balance of all demolition and removal work as required by the drawings and existing conditions, including performing of all necessary cutting, removals, and the like for the proper installation of all new work.
- 9. Properly protect existing plant functions and facilities from damage and dirt during construction operations.
- 10. Perform demolition of abandoned piping, wiring, or equipment items when safely disconnected from operating services.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above.

1.4 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies

024100 - 1 Demolition

- 1. All work of this section will be accomplished in strict conformance to applicable provisions of the Local and/or State codes.
- 2. OSHA Code requirements governing demolition work.
- 3. Comply with applicable requirements of American National Standards Institute (ANSI) Standard A10.6-1969, Safety Requirements for Demolition.
- B. Do all demolition work only at such times and in such a manner as is approved by the Owner and is in compliance with above referenced codes, documents, procedures, plans or instructions. Noise shall be held to a minimum when working in or around functioning areas.
- C. The work of this section shall be accomplished by a Contractor experienced in demolition work on projects of similar size and complexity within the past 5 years. Evidence of such experience on 5 such projects shall be submitted to the Owner for his evaluation.
- D. Maintaining Traffic
 - 1. Ensure minimum interference with roads, streets, parking lots, driveways, sidewalks, paths and adjacent facilities.
 - 2. Do not close or obstruct streets, driveways, lots, paths, sidewalks, passages and the like without permission of the Owner.
 - 3. When required by Owner or governing authorities, provide alternate routes around closed or obstructed traffic ways.
- E. Notify all corporations, companies, individuals or local authorities owning, or having jurisdiction over, utilities running to, through or across areas disturbed by demolition operations. The Contractor shall notify the following prior to beginning operations:
 - Digsafe
 - 2. All utility companies whose services are within 10 feet of the work of this Contract.
- F. Keep public ways clear of all spillage from trucks hauling material to and from the project site.
- G. Strict dust control measures shall be implemented and maintained at all times.

1.5 SUBMITTALS – Coordinate with Section 0133 00

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 15 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.

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- A. Prior to commencement of any demolition operations, the contractor shall submit to the Architect, for review, a schedule for demolition, means and methods for pedestrian access as well as building ingress and egress, and the proposed methods to insure against possible damage to existing areas adjacent to where demolition operations will occur.
- B. Permits, as applicable, for transport and disposal of debris and hazardous materials.
- C. Material Safety Data Sheet (MSDS) must be submitted for each product.
- D. Submit Waste Management Plan for review before start of job.
- E. Submit receipts for tipping fees.

1.6 SAFETY AND PROTECTION

- A. Carefully protect all work adjacent to areas in which work is to be done and areas used for access. Protect all floors where traffic requires it with suitable "rigid" protection material such as -
 - 1. Exterior grade plywood over finished surfaces;
 - 2. Steel street plates where vehicular traffic, construction equipment and other areas of heavy loading may occur.
- B. During the progress of the work take every precaution to avoid accidents and to protect the work, the occupants of the building, the employees of the Owner and the public against damage and injury. Where materials are stored in public areas or where work is in progress, protect same with fences, sheds, suitable barriers or guard rails and place electric lights on them at night.
- C. Provide and maintain all protective devices, including fences, barricades, bracing, shoring, planking, guards, warning lights and signs, as necessary or required for protection against personal injury or damage to property. Conform to ANSI AIC. 6-1069. Comply with all requirements of the governing Municipal and/or State Transportation Department having jurisdiction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Protective Devices and Materials shall be the Contractor's option, subject to approval of the Architect and in compliance with the reference standard.
- B. Power driven Tools only hand held electric power driven tools conforming to the following criteria shall be used to cut or drill concrete and masonry:
 - 1. Electric Chiseling Hammer
 - a. Power Data 115 Volts AC; 7-8 Amps; Three wire grounded connection
 - b. Percussion 2400-2600 Impacts per Minute
 - c. Type/Size Hand held (+ 18 inch length)
 - d. Unit Weight 12-15 pounds (minus chisel bit)
 - 2. Electric Hammer Drill
 - a. Power Data 115 Volts AC; 5-8 Amps; Three wire grounded connection
 - b. Percussion 2400-3200 Impacts per Minute
 - c. Type/Size Hand held (+ 18 inch length)
 - d. Unit Weight 12-15 pounds (minus chisel bit)
 - e. Speed Data 0-0500 RPM (Under load)
 - Electric Core Drill

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- a. Power Data 115 Volts AC; 7-8 Amps; Three wire grounded connection
- b. Floor or wall anchored unit.
- c. Speed Data 0-1500 RPM (Under load)

Any other hand operated electric tools used for cutting, sawing or other operations shall be submitted to the Owner's Representative for approval prior to use for execution of the Work.

PART 3 - EXECUTION

3.1 INSPECTION AND VERIFICATION OF CONDITIONS

- A. Examine all drawings covering the work of this Section and refer to all other drawings, including mechanical and electrical drawings, which may affect the work of this section or require coordination by this trade.
- B. Visit the site, verify all conditions covering or affecting the work of this Section.
- C. Before starting any work, make a thorough examination of those portions of the structure on which the work is to be performed to insure that areas to be demolished are unoccupied and discontinued in use.
- D. Do not commence work until conditions are acceptable to Architect and/or Owner's Representative.

NOTE: Failure to acquaint oneself with all known or apparent conditions will not be cause for extra compensation. Coordinate with "Conditions".

3.2 PREPARATION

- A. Provide, erect, and maintain erosion control devices, temporary barriers, and security devices at locations indicated on Construction Drawings.
- B. Protect existing landscaping materials, appurtenances, and structures, which are not to be demolished. Repair damage caused by demolition operations at no cost to Owner.
- C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as needed.
- D. Mark location of utilities. Protect and maintain in safe and operable condition utilities that are to remain. Prevent interruption of existing utility service to occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities as acceptable to governing authorities and Owner.
- E. Notify adjacent owners of work that may affect their property, potential noise, utility outages or disruptions. Contractor to coordinate with Owner.

3.3 SALVAGE

- A. Prior to the actual start of demolition and removal operations, the Contractor and the Owner's Representative shall inspect the overall premises for equipment and accessories to be salvaged including both those shown on the Drawings and such additional items as may be required by the Owner.
- B. All items designated to be saved will be tagged in a suitable manner for disposition.
- C. Carefully remove all such items to be reused, stored and the like and store same where directed by the Architect and/or Owner.

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D. Replace marred or damaged items without cost to the Owner.

3.4 DEMOLITION

- A. Do no demolition or remove any items until it is certain that a condition will not be created which might jeopardize the weathertightness or structural adequacy of the existing building.
- B. Demolish masonry walls and structural elements in small sections.
- C. Do not throw rubbish or old materials of any kind from the upper stories to any point outside the building.
- D. Proceed with the work of demolition and removal in an orderly manner and without noise or other disturbance to the operations of the existing facility.

3.5 TEMPORARY SHORING

- A. Execute all temporary shoring, bracing, framing and protection of existing walls and other affected portions of the structure which are designated to remain in place prior to start of demolition and/or to be altered as a result of the proposed construction work.
- B. Provide shoring in such a manner as to prevent any settlement or vertical or horizontal deformation of the existing structure. Before commencing with the work the Contractor shall thoroughly investigate the existing structure to verify its present condition.

Benchmark reference points shall be established on all elements prior to start of operations to provide a monitoring basis for performance.

- C. Temporary shoring shall be performed by a subcontractor thoroughly experienced in this type of work. Shoring shall be designed by a Professional Engineer, licensed in the Jurisdiction and retained by the Contractor at no additional expense to the Owner. Said Engineer shall prepare and submit drawings, to the Architect, for his review, showing all features of the work. The Contractor shall be fully and solely responsible for all design and installation of the shoring.
- D. Shores shall consist of steel members or substantial timbers free from splits, holes, notches, warpage or other deformation. Sizes shall be adequate to support the imposed loadings.
- E. Shore walls by needling, shimming, drypacking, etc., in a neat and safe manner. Do not cut holes in walls where they would be exposed in the finished work unless there is no alternate method of needling.
- F. Plan removal of shoring carefully so as to transfer loads uniformly and without impact to new structural elements.
- G. The Contractor shall be fully responsible for the existing structure during all shoring operations.

3.6 DISPOSAL – (COORDINATE WITH WASTE MANAGEMENT PLAN ESTABLISHED IN SECTION 01 74 19)

- A. Remove all debris and refuse materials from the premises as rapidly as demolition progresses.
- B. Rubbish shall not be allowed to accumulate. Remove rubbish from job site each day and leave premises and work in a clean condition. Loose rubbish shall not be piled on or near the premises. The Owner's refuse facilities shall not be used and rubbish shall not be placed in Owner's dumpsters, incinerators, garbage or rubbish

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- containers or the like. Location of rubbish containers shall be cleared with the Architect and Owner before placement.
- C. Fires for burning of rubbish and debris or any other purposes are forbidden. This prohibition will be continuously enforced by the Owners' Representative.
- D. All materials resulting from the demolition operations shall become the property of the Contractor and he shall dispose of all debris OFF THE SITE.

Hazardous materials are to be transported and disposed of by a licensed toxic waste transporter in accordance with applicable Local, State and/or Federal regulations. Most stringent regulations shall govern.

E. No storage of materials resulting from the demolition operations will be permitted on the site.

End of Section

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Orange-Ulster BOCES
Interior Alterations – Third Floor
Regional Education Center at Arden Hill

SECTION 035400 - FLOOR FILL/UNDERLAYMENT SYSTEMS

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all <u>floor fill/underlayment system work</u> for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - 1. The intent of this contract is to provide a consistent, level floor slab for the entire work area of the Third Floor Level of the building. The Contractor shall fully inspect the existing conditions, remedy all existing defects, and provide all necessary materials to achieve that result at no additional cost to the contract.
 - Provide a self leveling water resistant cementitious fill system, capable of featheredge finish to a maximum 1 inch thickness (without addition of aggregate), complete with appropriate primer system for substrate encountered for the entire Third Floor area and to the extent required by finish schedules and/or details.
 - 3. Preparation of floor surfaces and protection of adjacent construction prior to placement of fill material, including patching floor concrete floors, removal of existing metals and piping and grinding down high spots in existing concrete to achieve uniform surface.
 - 4. Infilling perimeter voids at exterior walls with rigid insulation and preparing substrate for cementitious fill to face of exterior wall, including protection of spaces below from potential damage due to the installation process.
 - 5. Resultant installation shall be tested in accordance with ACI 302, Class A flatness tolerance of 1/8 inch maximum deviation under a 10 foot straight edge in any direction.

NOTE: COORDINATE WITH THE CONTRACTOR FOR BROOMING OPERATIONS PRIOR TO VACUUMING/CLEANING OPERATIONS AS PER PARAGRAPH 3.02.A HEREIN.

3.3 RELATED WORK SPECIFIED ELSEWHERE - Entire Project Specification.

1.4 QUALITY ASSURANCE

- A. The work of this Section shall be accomplished by a Specialty Contractors with mechanics skilled in each of the trades involved with the respective items specified herein.
- B. Before starting any work under this Section, all surfaces and attachments to receive work herein shall be inspected as per Part 3, Article 3.01.
- C. Prior to installation ascertain that the building is sufficiently weathertight to prevent damage to the work. Roofing and roof flashings shall have been completed and roof found to be watertight. All exterior openings shall have been glazed or otherwise weather protected.
- D. All work of a nature conducive to high humidity conditions shall have been

- completed and be thoroughly dry. This contractor shall be held responsible for the cost of replacing all work of this Section damaged due to his failure to take the above precautions.
- E. Installer's Qualifications: Installation shall be by a licensed applicator authorized by the manufacturer using approved mixing and pumping equipment.

1.5 SUBMITTALS – Coordinate with Section 013300

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. All materials, if requested, to make up floor fill system.
- B. Product Data Sheets indicating test performance, composition, application criteria, and the like.
- C. Certification of specification compliance.
- D. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each product.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. General Requirements: Materials shall be delivered in their original, unopened packages, and protected from exposure to the elements. Damaged or
- B. deteriorated materials shall be removed from the premises.

1.7 SITE CONDITIONS

A. Environmental Requirements: Building interior shall be enclosed and maintained at a temperature above 50 degrees F (10 degrees C).for 72 hours before installation through drying of product as identified in Section 3.2

1.8 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - Water based.
 - Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.

- 6. Low or preferably no Volatile Organic Compound (VOC) content.
- 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
- 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
- 9. Do not contain methylene-chloride.
- 10. Do not contain chlorinated hydrocarbons.
- 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 – PRODUCTS

2.1 FLOOR FILL SYSTEM

- A. Non-combustible, high density poured or pumped cement mixture which, after hardening, will comply with the following performance characteristics.
- B. Material shall be similar and equal to "Ardex K-15" or "Thoro Underlayment" installed by an authorized representative of the manufacturer.

2.2 MATERIALS

- A. Material shall be a special cement blend when combined with water become a liquid compound which will seek its own level and automatically produces a smooth, flat and hard surface.
- B. Primer/Sealer/Bonder floor primer, sealer and bonder, in formula as suitable for encountered substrate.
- C. Aggregate (thickness over 1 inch) 1/4 inch, maximum; 1/8 inch minimum washed and graded gravel.
- D. Water Potable free from impurities that affect the setting of underlayment.
- E. See Section 07 21 00 for rigid insulation to be used to infill voids in perimeter of existing slab.

2.3 MIXING PROPORTIONS

- A. Water in quantity as directed by manufacturer to one (1) 55 pound bag of premixed underlayment material.
- B. Do not over water, water amount may vary with temperatures and, aggregates, if used.

2.4 PROPERTIES

- A. Compressive strength, psi, 28 days --- 4,100 (ASTM C 109)
- B. Flexural strength, psi, 28 days ----- 1,000 (ASTM C 348)
- C. Fire Resistance/ASTM E 84 Class 1 -- 0/0/0

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 INSTALLATION

- A. Clean floor surfaces and other construction prior to placement of fill material.
- B. Mixing of primers, if required, and fill materials shall be done in accordance with manufacturer's printed instructions.
- C. Prior to installation of system, a two component bonding agent approved by the manufacturer of the fill system shall be rolled or broomed over the entire substrata.
- D. Place fill on prepared stratas to a minimum thickness of 1/8 inch or as may be otherwise indicated on the drawings or required by field conditions.
- E. Place in a continuous operation so as to avoid seams or layers and to insure a monolithic, homogeneous product.
- F. Trowel to a smooth and level surface ready for application of applied finishes.

3.3 CLEANING AND PROTECTION

- A. Foot Traffic: Light foot traffic allowable, 2-3 hrs. after final screeding. Heavy foot traffic shall be delayed until 12 hrs. after underlayment is installed.
- B. Protection From Heavy Loads: During construction, place temporary wood planking over underlayment wherever it will be subject to wheeled or concentrated loads.
- 3.4 WASTE MANAGEMENT Coordinate with Section 01 74 19
 - A. Before concrete pours, designate locations or uses for excess concrete.
 - B. Before concrete pours, designate a location for cleaning out concrete trucks. Options include:
 - 1. Company-owned site for that purpose (meeting environmental standards).

End of Section

SECTION 055000 - METAL FABRICATIONS - MISCELLANEOUS/ORNAMENTAL METALS

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all <u>miscellaneous and ornamental metal work</u> for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - Furnish <u>and/or</u> provide lintels as required, in sizes shown on the Architectural and Structural Drawings, or in absence thereof at door and window openings, recessed construction, duct openings and like locations supporting masonry over 3 courses above said opening and in excess of 16 inch widths.

Assemblies shall be hot-dipped galvanized <u>after fabrication</u> where exposed to the weather and when used in masonry construction in the enclosed areas.

Units under 100 lbs. in total weight and set in masonry shall be installed under Section 04 20 00 and companion sections; balance of units shall be installed under this work.

<u>NOTE</u>: Coordinate with Section 02 41 00 for demolition operations in connection with new openings in existing walls and slabs

- 3. Provide overhead supporting systems in connection with;
 - a. glazed interior and exterior walls as applicable and the like. Provide required diagonal bracing as necessary to insure stable installation.
- 4. Provide plate and angle systems welded to structural steel to serve as partition supports at stair wells, shafts and the like. Coordinate with Sections 05 12 00, 07 81 00 and 09 29 00.
- 5. Provide all required angles, floor plates, clips and the like as may be required for installation of the work of this section.
- 6. Provide all required support iron, angles and the like as required to complete the installation of the work of this project.
- 7. Furnish to Section 06 20 00, miscellaneous angles, clips and other metal reinforcements as may be required to complete the millwork operations; bracket supports for counters, if required, will be provided by Millwork Contractor as part of their work.
- 8. Alter existing structural elements and provide new sections as indicated and/or required to frame openings for ducts, equipment and the like as well as to provide adequate support for same.
- 9. Cut openings in roof decking and concrete slabs as required; provide new support framing as detailed and/or necessary to support equipment and free deck ends.

- 10. Perform all drilling and tapping required for attachment of this work to the work of others.
- 11. Protect all dissimilar materials.
- 12. Perform all shop, prime and field touchup painting operations.
- 13. Provide miscellaneous gratings, curb angle frames and the like as shown and/or required to complete the work.
- 14. Provide any other miscellaneous angles, channels, plates or shapes indicated or required for the proper installation of the work as shown, including all clips, anchors, bolts and the like as required to secure the work of this section to adjoining work.
- 15. Furnish inserts for ladders and relieving angles and such other items to Section 03 30 00 for installation; coordinate with Section 04 20 00 for installation of relieving angles; further, furnish for installation by others, all other items to be embedded in construction that are necessary for attachment of work of this Section.

<u>NOTE</u>: All metal work exposed to the weather or subjected to moisture shall be hot-dipped galvanized after fabrication or "zinc-rich" coated after proper preparation in accordance with the requirements of Part 2 of this Section.

1.3 RELATED WORK SPECIFIED ELSEWHERE - Entire Project Specification with specific reference to those sections noted above.

1.4 QUALITY ASSURANCE

- A. Requirements given herein may be affected by other related requirements of the project specification. Correlation of contract requirements is the responsibility of the Contractor.
- B. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure steady progress of all work under Contract
- C. The work under this Section shall be performed by a Fabricator and Erector acceptable to the Architect. The Fabricator and Erector shall submit conclusive evidence of having satisfactorily completed work of similar scope and of having the necessary skill, equipment, facilities and capacity to fabricate the work and to perform the erection in accordance with the construction schedules and in full compliance with all requirements of the Contract Documents.
- D. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- E. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

1.5 SUBMITTALS – Coordinate with Section 01 33 00

Submittals shall be made in groupings where installations are complementary,
 i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings;

- mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Shop drawings of all items to be fabricated and installed. Show dimensions and details of all items. Verify dimensions and correlate metal work with adjoining work. Obtain approval of shop drawings before fabrication.
- B. Samples of all manufactured items.
- C. Certification of Specification Compliance.
- D. This Contractor shall take all necessary field measurements prior to fabrication and installation of work and shall assume complete responsibility for accuracy of same.
- E. Material Safety Data Sheet (MSDS) must be submitted for each product.
- F. This Specialty Contractor shall hire a professional engineer, licensed in the jurisdiction to design all structural components and members of all railings, hangers, anchors, struts, tie-backs, bracing and like elements required to complete the work of this project as related to miscellaneous and ornamental metal operations all in accordance with the governing Building Code and subject to approval by the Architect. Coordinate work with both Sections 051200 and 055100 as applicable.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 016100)

- A. Stock commercial methods, materials, products, patterns and fabrication methods meeting requirements of this Specification and conforming substantially to details and design indicated on Drawings will be accepted. See Drawings for locations, sizes and details not in this section.
- B. All connections shall be securely and neatly screwed, welded, tenoned, or riveted together with dowels or countersunk rivets and dressed flush. All surfaces shall be dressed smooth and be free from mill marks or imperfections. Joints shall be tight and inconspicuous without the use of painting or caulking. Permanent connections shall be riveted or welded where practicable.
- C. Welding shall comply with the applicable current standards, specifications, and codes of the American Welding Society. Welds shall be continuous except where spot welding is specifically permitted by the Architect. Where exposed, welds shall be ground to a smooth surface.
- D. All units shall be properly laid out and spaced between terminals so that there shall be no cutoff or other uncertain finish.
- E. Joints in exterior work shall be made watertight. All miters shall be cut and finished to a perfect fit.

- F. Necessary ribs, brackets, fillets and other reinforcement in cast work shall be cast integrally with the main body of the work. Castings shall be sound and free from warp or defects impairing strength or appearance. Exposed surfaces shall have smooth finish and sharp, well defined lines and arises. Joints shall be machined to close fit.
- G. All rolled shapes shall be carefully straightened and shall be free from twist before the start of fabrication. All exposed fastenings shall be evenly spaced.
- H. Do all cutting, drilling, fitting and work of a similar character required in fitting and setting the materials in place, and in fitting of this work to the adjoining work of other trades.
- I. Provide connecting members, bolts, anchors, clip angles, rivets, screws, expansion bolts, etc., as required for the work of this Section, and as necessary for the attachment of other materials to the work, and not specified in other sections.
- J. All metal items which are to be used on the exterior or placed in exterior walls shall be hot dipped galvanized after fabrication.
- K. All connecting members, bolts, anchors, etc., which are to be covered with masonry shall be installed as far as practicable as the work progresses, so as to avoid cutting or drilling.
- L. Bolting, where permitted, shall be done with proper size bolts with nuts drawn tight and for permanent connections, with threads upset.
- M. All operative items shall be carefully adjusted and left in satisfactory working order.
- N. Where anchors and fasteners are not fully detailed, their sizes, forms, attachment and location shall be such as to conform to the best shop and industry practice. Anchors shall have protective coat of paint as specified for shop coats.

1.7 WELDING

- A. Welding must be performed by welders who have been certified by an approved Testing Laboratory within previous two year period. Submit proof of such certification to Architect before work is performed. Comply with AWS D1-1 "Structural Welding Code".
- B. All welding which is done on steel and miscellaneous metal work to remain exposed in the finished work shall be "Architectural", i.e. these welds must be ground smooth and show no seams. Rules and regulations governing all welding operations are set forth in Section 01 50 00.

1.8 PAINTING AND PROTECTION OF DISSIMILAR SURFACES

- A. General preparation of metal surfaces to receive shop coating shall be in accordance with the methods outlined in the Steel Structures Painting Council Specification (SSPC) as may be applicable for intended exposure and location, and further;
- B. Where aluminum components are in contact with, or fastened to dissimilar metals, except stainless steel or zinc, the dissimilar metals shall be given a coat of zinc chromate primer and a heavy brush coat of alkali-resistant bituminous paint. In permanently dry locations the metals may be separated by nonabsorptive plastic tapes or gaskets.
- C. Aluminum in contact with, or built into masonry, concrete, or plaster shall be given a brush coat of alkali-resistant bituminous paint, or clear methacyrlic lacquer.

- D. Where aluminum is in contact with wood or other absorptive material which may become repeatedly wet, the wood or other material shall be given a coat of aluminum pigmented bituminous paint. Joints shall be sealed with sealant compound at points of contact with aluminum.
- E. All ferrous metals shall be thoroughly cleaned and, except items to be encased in concrete, given a priming coat of approved shop paint. Surfaces shall be thoroughly covered and shall be free of runs or sags.
- F. Items which support masonry or will be concealed in the finished work, except items encased in concrete, shall be field painted before erection of enclosing construction. Where shop coat is abraded or burned out by welding, the protection shall be the same paint as used for the shop coat, tinted to a different shade.
- G. Manufacturer's standard shop coat will be accepted for items subject to foot and vehicle traffic and for built-in items, except that bituminous coatings shall not be used for items to be finished with decorator paints.

1.9 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Ladders: Provide ladders capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss. Temperature Change (Range): 120 deg F ambient; 180 deg F material surfaces.

1.10 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 GENERAL

A. For fabrication of miscellaneous and ornamental metal work which will be exposed to view in the finished work, use only materials which are smooth and

free from surface blemishes including pitting, seam marks, roller marks, trade names, roughness and other defects which will be apparent in the finished products.

- B. Stock materials, patterns, products and standard methods of fabrication will be approved provided they conform to specified requirements and in general to the details shown.
- C. Metals and accessory items shall conform to the current applicable recognized industry standards and the following grades.

2.2 FERROUS METAL WORK

- A. Structural steel shapes galvanized when exposed to weather or moisture, prime coated for interior.
 - 1. W-Shapes: ASTM A 992/A 992M
 - 2. Channels, Angle-Shapes: ASTM 36/36M
 - 3. Plates and Bars: ASTM 36/36M
- B. Steel plates for bending or cold forming ASTM A 283, Grade C.
- Carbon Steel Sheets ASTM A 653, galvanized where exposed to moisture or weather.
- D. Standard Steel Sheets ASTM A 1011, galvanized when exposed to moisture or weather.

2.3 STEEL PIPE, TUBES, BAR STOCK

- A. Steel Pipe ASTM A 53, Type S, Grade B, galvanized for moisture and/or weather exposure.
 - 1. Standard for general use.
 - 2. X-Strong and/or XX-Strong for bollards, railings and other items not satisfying criteria set forth above or required to satisfy safety and performance criteria.
- B. Posts, Pickets and Rails
 - 1. All metals shall be made of milled steel suitable for hot-dip galvanizing as specified in ASTM A 384 and A 385.
 - 2. Posts are to be square tubestock.
 - 3. Pickets are to be poled steel square bar stock.
 - 4. Rails are to be flat rectangular bar stock.

2.4 ALUMINUM

A. Material shall be 6063 alloy as suitable intended use and for receiving finishes as required for respective installations on project.

1.5 STAINLESS STEEL MATERIALS

- A. General ASTM A 167, AISI Types 302/304 with #4 finish for exposed surfaces and mill for concealed surfaces unless otherwise required.
- B. Rails shall be provided with ANSI B36.19 designation for standard Schedule 40 pipe unless otherwise specified or <u>required</u> due to code conditions governing point loading restrictions.

2.6 FASTENERS, INSERTS, MISCELLANEOUS

- A. Bolts & Nuts (Steel) ASTM A 307.
- B. Inserts Threaded, wedge or slot type, galvanized castings, ASTM A 47 or A 27.
- C. Fasteners and anchorage devices shall be of type, grade, class and style best

- suited for the respective purposes; galvanized, cadmium plated or stainless steel.
- D. Use flat head Phillips type machine screws for exposed fastenings OR tamperproof devices as directed by the Architect and/or conditions of use.

2.7 SADDLES

- A. Abrasive cast aluminum saddles shall be provided at all exterior entrances, where shown on the drawings.
- B. Abrasive cast aluminum saddles shall be as manufactured by Wooster Products Co., or approved equal, of shapes and sizes indicated on the drawings.

2.8 PROTECTIVE COATING SYSTEMS

- A. Galvanizing ASTM A 153 for iron and steel hardware; A 123 for rolled, pressed and forged steel shapes, plates, bars and strips 1/8 inch thick and heavier; A 386 for assembled products; A 526 hot dip galvanizing in accordance with A 525, Designation G90 for all carbon steel sheet. Galvanize all structural steel tubing and pipe to ASTM A 123, and bolts, nuts and washers to A 153. Repair unacceptable galvanized surfaces in accord with ASTM A 780.
- B. Protective coating cold applied asphaltic mastic, SSPC-12, 30 dmt/coat.
- C. Provide factory-applied polyamide epoxy primer over specially prepared galvanized steel, 2.0 mils dry film thickness minimum. Apply primer within 12 hours after galvanizing at the galvanizer's plant in a controlled environment meeting applicable environmental regulations, and as recommended by coating manufacturer.

Engage the services of a galvanizer who has demonstrated a minimum of 5 years experience in the successful performance of the processes outlined in this specification in the facility where the work is to be done and who will apply the galvanizing and coating within the same facility as outlined herein.

2.9 FABRICATION, GENERAL

- A. Welding Comply with requirements of the American Welding Society (AWS).
- B. All Welding: By licensed welder.
- C. Welding Electrodes E60XX classification of AWS A5.1.
- D. Grind welds smooth.

2.10 SHOP PAINTING - (reference 099000)

- A. Ferrous metal primer modified alkyd rust inhibitive material similar and equal to Tnemec 99.
- B. Galvanized surface repairs and welds, "Zinc-Rich" material.
- C. Architectural Finish Systems: (Architect to provide paint sample)
 - 1. All prefinished metalwork shall receive a factory applied epoxy primer, 2.0 mils dry film thickness minimum, within 12 hours after galvanizing.
 - 2. All metalwork shall receive two finish coats at minimum application coverage of 2.0 mils dry film thickness for each coat.
 - 3. Paint shall be a high quality aliphatic polyurethane as specified in Section 09 90 00, color to be selected by the Architect.

2.11 ANCHORAGE MATERIALS

A. Anchoring cement grout for railings and other such items embedded in construction and requiring same shall be "LokSet QR 10" by Fosroc/Preco.

Equal materials shall have a maximum expansion rating of 0.2% and an ultimate compressive strength of 11,000 psi.

- B. Mechanical/Chemical Anchors Systems:
 - 1. Special duty anchor for hollow masonry construction shall be Hilti "HIT C-20" in rod and tube sizes required for conditions encountered and/or as dimensioned on the drawings.
 - 2. Anchor systems for structural attachment to concrete shall be Hilti "HSL Metric Heavy-Duty Expansion Anchor" system in sizes required for conditions encountered and/or as dimensioned on the drawings.

2.12 SHELF AND RELIEVING ANGLES

- A. Fabricate shelf and relieving angles from steel angles of sizes indicated and for attachment to concrete framing. Provide slotted holes to receive 3/4 inch bolts.
- B. For cavity walls, provide vertical channel brackets to support shelf/relieving angles from backup masonry and concrete. Align expansion joints in angles with expansion joints in cavity wall exterior wythe.
- C. Galvanize all angles to be installed on exterior framing.
- D. Furnish, to Section 033000 for setting, wedge-type concrete inserts, complete with fasteners, for attachment of shelf angles to cast-in-place concrete.
- E. Leave 1/2 to 3/4 inches between sections of angles for expansion.

2.16 MISCELLANEOUS PLATES AND SHAPES

- A. Furnish items that do not form a part of the structural steel framework, such as lintels, sill angles, miscellaneous mountings and frames, etc.
- B. Provide lintels fabricated from structural steel shapes over openings in masonry walls and partitions as indicated and as required to support wall loads over openings. Provide with connections and fasteners or welds. Construct to have at least 6 inches bearing on masonry at each end.
- C. Provide angles and plates, ASTM A 36/A 36M, for embedment as indicated. Galvanize embedded items exposed to the elements according to ASTM A 123/A 123M.
- 2.17 Balance of materials shall be as specified elsewhere in this Section.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 MISCELLANEOUS

A. Steel lintels shall be the full thickness of the masonry and bear at least 6 inches on masonry at each end to support all openings as defined in Part 1 of this Section.

No lintels shall be required for openings in masonry partitions less than 3 feet 4 inches wide and having full width metal bucks EXCEPT where same are in rated walls, coordinate with door schedules and details, nor will they be required where

attached lintels are indicated on the Structural drawings.

- B. Provide at the proper time all the various miscellaneous metal supports and framing not provided under other sections and required to complete the work.
- C. All items of miscellaneous metal such as access doors, manhole covers, plate frames and covers, and the like not otherwise specified, but shown on the drawings shall be part of this contract.
- D. Provide inserts of size and type as required as detailed and/or necessary for support of work of this project.
- E. Relieving angles (not attached to structural steel or light metal framing as specified elsewhere), hangers, channel bucks, channel frames, support frames and other items of miscellaneous iron shown on the drawings but not specifically covered in the work above shall be considered to be part of work of this Section and shall be done in accordance with best industry practices.

3.4 FINISHING

- A. Clean and repair any damage to paint after erection.
- B. At galvanized surfaces, apply orange zinc repair paint in compliance with ASTM A 780. Galvanizing paint shall have 95% zinc by weight. Thickness shall not be lesser than required by ASTM A 123 or A 153 as applicable.
- C. Touchup of galvanized surfaces with aerosol spray, silver paint, brite paint, etc. is unacceptable.

3.5 PROTECTION

- A. Protect existing construction, adjacent work and finished work from damage.
- B. Provide drop cloths or other suitable protective coverings in all areas of the work.
- C. Damage caused by the handling, storing, mixing or application of materials or the failure to provide adequate protection shall be repaired or replaced at no additional cost to the Owner.

3.6 ACCEPTANCE AND PATCHING

- A. On completion of work, all equipment and rubbish resulting from the work of this section shall be removed from the premises.
- B. Leave work clean, whole, and sound ready for additional finish or sealing as specified and/or as shown on the drawings.

3.7 WASTE MANAGEMENT – Coordinate with Section 017419

- A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
- B. Set aside and protect materials suitable for reuse and/or remanufacturing.
- C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

End of Section

Orange-Ulster BOCES
Interior Alterations – Third Floor
Regional Education Center at Arden Hill

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all rough carpentry work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:

<u>NOTE</u>: Material which is buried in construction such as roof blocking, window blocking and the like shall be preservative treated; blocking in connection with doors and door frames, interior framing for partitions and furring for wall treatments, support/blocking for casework, etc. shall be fire treated. *Roof blocking shall only be BORATE preservative treated or Douglas Fir.*

- Provide all wood blocking, battens, nailers, grounds, furring and the like required to secure the work of this and all other sections. Further, attention is directed to requirement for concealed blockings to be provided at all hardware locations (<u>including door stops</u>), window treatments, bathroom and toilet room accessories, digital display screens, white boards, casework, millwork, fixtures and like locations to provide for secure attachment. Coordinate blocking requirements with that specified in Section 09 29 00.
- 2. Provide temporary partitions, dust and noise control enclosures, temporary doors and bucks, temporary exterior opening enclosures; guard rails at openings and the like; coordinate with Sections 02 41 19 and 01 50 00.
- 3. Provide Douglas Fir or equal BORATE treated wood roof blocking as required. Coordinate with Sections 07 55 00 and 07 61 10 for extent of work, Section 05 50 00 for galvanized anchor bolts and Section 04 20 00 for installation of said bolts. NOTE: Blocking, nailers, and plywood shall be fastened to resist a force of 175 pounds per linear foot in any direction.
- 4. Provide all fasteners, anchorage items and rough hardware required for the work of this Section whether or not specified in detail.
- 5. Perform all priming, backpainting, shop coating and the like necessary to complete the work of this Section.
- 6. Provide all other labor, materials, equipment, and accessories and other items necessary to make the work of this Section complete.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. Special built metal and/or wood casework.

1.4 QUALITY ASSURANCE

A. Requirements given herein may be affected by other related requirements of the project specifications. Correlation of the contract requirements is the responsibility of the Contractor.

- B. All materials used for work of this Section shall conform with Voluntary Product Standards and trade Association Units as follows:
 - 1. Northeastern Lumber Manufacturer's Association Inc. (NELMA); Southern Pine Inspection Bureau (SPIB); Western Wood Products Association (WWPA).
 - 2. American Plywood Association (APA); Douglas Fir Plywood Association (DFPA).
 - 3. Architectural Wood Work Institute (AWI)
 - 4. American Society for Testing and Materials (ASTM).
 - 5. American Wood Preservers' Association and Institute (AWPA) (AWPI)
 - 6. Applicable Federal Specifications for fasteners, bolts, nails, screws, etc.
 - 7. Structural standards as set forth by American Forest and Paper Association (AFPA)
 - 8. New York State Building Code.
 - 9. Underwriters' Laboratories, Inc. (UL) Building Materials Directory, Sections BPVV, BUGV and as applicable to materials specified within this Section.

Reference Standards Specific to Fire Retardant Treatments in addition and/or supplement to those voluntary standards set forth above.

- 1. ASTM D 3201 Test Method for Hygroscopic Properties of Fire Retardant Wood.
- 2. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials Extended 30 minute test.
- 3. Military Specifications MIL-L-19140E Lumber and Plywood, Fire Retardant Treated.
- C. Identify each piece of dimensional lumber and plywood with Underwriters Laboratories, Inc. mark certifying surface burning characteristics, interior Type A in accordance with AWPA C-20 (Lumber) AWPA C-27 (Plywood), kiln-dried after treatment (KDAT). Identification mark shall also indicate monitoring by Timber Products Inspection, Inc., in accordance with nominated manufacturers standard governing such work.
- D. Quality Mark: All borate preservative treated wood members shall bear a permanent ink stamp indicating the following:
 - 1. Manufacturer's name.
 - 2. Treatment plant name.
 - 3. Quality mark of an AWPA approved independent inspection agency.
 - 4. Symbol "SBX" (sodium borate), preservative retention level, and date of treatment.
 - 5. AWPA treatment standard, wood species, and the words "Above Ground and Continuously Protected From Liquid Water."

1.5 SUBMITTALS – Coordinate with Section 01 33 00

• Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.

- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Each type of material and anchorage devices to be used in the work of this section.
- B. All other items as deemed necessary by the Architect.
- C. Certification of specification compliance for materials incorporated in the work including the National Evaluation Report discussing high temperature strength testing, flame spread, corrosion, and hygroscopic properties for fire retardant treatments.
- D. This Contractor shall take all necessary field measurements prior to fabrication and installation of work and shall assume complete responsibility for accuracy of same.
- E. Material Safety Data Sheet (MSDS) must be submitted for each product.
- 1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)
 - A. Deliver all materials to the job site clearly labeled as to product, manufacturer, color and/or other pertinent characteristics.
 - B. Pile lumber to insure proper ventilation and drainage.
 - C. Store materials a minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
 - D. Protect fire retardant materials against high humidity and moisture during storage and erection. Keep materials dry during delivery and storage.
 - Where applicable, roof sheathing should be covered with felt or roofing the same day it is installed. If wetted during construction, allow to dry before enclosure.
 - E. Provide temporary enclosure of doors, windows and other exterior openings when necessary to meet conditions specified; maintained in good repair; and remove when no longer required. Protect door and window frames, trench covers and floor hatches from traffic and protect exterior masonry from mortar drippings.

1.7 SITE ENVIRONMENTAL PROCEDURES

- A. Indoor Air Quality:
 - 1. Temporary ventilation: Provide temporary ventilation during work of this Section.
 - a. During and immediately after installation of treated wood, engineered wood products, and laminated wood products at interior spaces, provide temporary ventilation.

1.8 WARRANTY – Treated Wood, 20 years.

1.9 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Grade Marking: Grade Mark, trademark and mill identification of the trade association having jurisdiction shall appear on each piece of standard yard dimension lumber (not boards) except that the shipment may instead be accompanied by a Certificate of Inspection identifying Compliance with these Specifications. This certificate shall be issued by an agency authorized to grade by the manufacturer's association recognized as responsible for grading rules for species involved.
- B. Moisture Content: Lumber 2 inches and less in thickness, and boards, shall not exceed 19%.
- C. SIZING: Surface lumber 4 sides as per Simplified Practice Recommendations PS16, latest edition.
- D. Grounds, blocking, furring and the like No. 2 and better Douglas Fir, West Coast Hemlock, Southern Yellow Pine, Sitka Spruce or Northern Pine.
- E. Lumber for concealed work shall be fire and/or preservative treated and of suitable construction grade species.
- F. Beveled Siding: Utility grade cedar or redwood siding, 1/2 inch by 6 inches and 3/4 inch by 10 inches, tapering to 1/8 inch thick.

2.2 PLYWOOD

- A. Roof Sheathing * inch, APA "Rated Sheathing, EXT", provide either tongue and groove edges or ply-clip fasteners.
- B. Panel System 3/4 inch APA "A-D'. Interior, Exp 1.
- C. General Purpose, Concealed APA, EXT B/C in thickness to suit conditions of use and/or as shown on the drawings.
- D. General Purpose, Exposed one side and painted APA MDO EXT.
- 2.3 GLUES AND ADHESIVES <u>NOTE</u>: All adhesives used in the work of this project shall be VOC compliant in accordance with requirements of the applicable codes.

- A. Glue Type II moisture resistant adhesive for interior use and Type I waterproof adhesive for exterior and all fabricated systems used in "wet" areas. No stain lines permitted.
- B. Adhesives "Construction Adhesive" by Sika Corporation; "TiteBond Construction Adhesive" by Franklin International; "Speed Grip" by Geocel Corp. and deemed suitable for intended application.

2.4 CARPENTER IRON AND ROUGH HARDWARE

- A. All anchorage items shall be sized to meet requirements and conditions at the site. All anchorage items shall be non-corrosive steel. Provide backup plates and other devices as part of the work of this Section.
- B. Rough hardware shall be of commercial quality of ample size and type to support live and dead loads and to hold members securely in place and in conformance with National Design Specifications as recommended by NFPA. Nails, spikes, screws, bolts and similar items shall be of sizes and types to rigidly secure members in place and as shown on the drawings. Bolts and lag bolts shall comply with ASTM A 307. Lag bolts shall be zinc plated.
 - 1. Bolts and screws shall penetrate structural substrate at least 1/2 of a wood substrate thickness, at least 3 inches into concrete and masonry substrates and as shown on the drawings.
- C. Other fastening devices, either hand or machine driven, may be used if equally suitable and as strong as those shown or specified, and if such performance qualities have been properly determined and if the Architect has given written approval of each type, size and use of such devices.
- D. Bolts and nuts shall conform to FS #FF-B-571, all clamps, expansion bolts, expansion sets, washers, anchors, steel and iron shall be galvanized and of standard type.
- E. Lag screws: FS #FF-B-561; Nails: FS #FF-N-101 or may be drive screw or spiral type of standard make.
- F. Steel plates, shapes, etc. shall be of type and grade normally used in Commercial practice.
- G. Fasteners for IPE wood shall be stainless steel IN ALL AREAS OF WORK.
- H. Toggle bolts for fastening of wood to hollow wall construction shall be of spring wing type, not less than 3/8 inch diameter; screws shall be not less than 1/4 inch diameter self-drilling type.
- Wood-to Wood connections annular ring nails in gauges as detailed and/or required with length to provide a minimum of 1-1/2 inch embedment into the final piece receiving the nail points, except full depth into plywood.
- J. Wood to Concrete and/or masonry minimum 3/8 inch diameter stainless steel sleeve or wedge anchors by Ramset/Redhead Division of ITW; Powers Fasteners; Simpson Strong Tie; or equal showing compliance with applicable building codes and industry governing bodies..
- K. Treated wood roof blocking to metal decking Type #12-11, standard steel deck screws, corrosion protected of length equal to overall depth of wood and deck plus 1/2 inch penetration.

2.5 FIRE TREATMENT

A. Each piece of lumber and plywood shall bear the Underwriters Laboratories (UL) Classification Mark certifying a flamespread rating of 25 or less in the (ASTM E 84)

- "Tunnel Test", and when the test is extended for 20 additional minutes (30 minutes total), the flame shall not extend more than 10.5 feet from the center line of the burner and there shall be no evidence of significant progressive combustion.
- B. Lumber design values and plywood span ratings shall be recognized by issuance of a National Evaluation Report which shall include evaluation of strength testing for roof applications.
- C. In addition to UL monitoring for flamespread certification, production and kiln drying after treatment shall be monitored by Timber Products Inspection (TP).
- D. Lumber shall be kiln dried after treatment to 19% or less moisture content, and plywood to 15% or less moisture content.
- E. Treatment formulation shall contain no halogens, sulfates, chlorides or ammonium phosphate.
- F. Treatment shall qualify as non-hygroscopic in accordance with ASTM D 3201.
- G. System shall be similar and equal to that as manufactured by Hoover "PYRO-GUARD 3rd Generation Fire Retardant Treatment"; Hickson "Drycon"; Chemical Specialties, Inc. or approved equal and shall be certified as "paintable" or "stainable" in accordance with the requirements of this project.

2.6 BORATE OR SODIUM SILICATE PRESERVATIVE TREATED WOOD PRODUCTS

- A. Manufacturer
 - 1. Borate Treated Systems -Osmose, Inc., Wood Preserving Division
 - 2. Sodium Silicate Systems TimberSIL (SST).
- B. Borate Preservative Treatment: Disodium octoborate tetrahydrate (DOT) treatment for insect and decay protective pressure treatment of wood as produced by manufacturer's licensed treatment plants, producing material meeting the following minimum standards:
 - 1. Preservative Treatment Standard: AWPA P5.
 - 2. Structural Lumber Treatment Standard: Comply with AWPA C31.
 - 3. Plywood Treatment Standard: Comply with AWPA C9.
 - 4. Treatment Level: Provide borate preservative treatment retention level recommended by manufacturer to provide the following minimum protection, as indicated on wood product quality stamp specified in Quality Assurance article: .42 DOT retention (0.28 pcf (4.5 kg/m3) B2O3) minimum retention (required for warranty).
- C. Field Applied End Coat: Preservative solution approved by preservative treated wood manufacturer for application.
 - 1. Osmose, Inc., Tim-bor disodium octaborate tetrahydrate (DOT), 10% solution.
 - 2. Copper Naphthenate, 2% solution, copper metal basis.

Where it is necessary to frame lumber on the job after treatment, all cut surfaces, bolt holes and machined areas shall be liberally brushed with the same preservative in accordance with AWPA Standard M4. Where shrinkage is a serious fault or where treated lumber will be in contact with lime or cementitious surfaces, and where water-borne treated lumber is to be painted, excess moisture will be removed. Lumber 2 inch nominal and less shall be dried to 15-19% moisture content, and material to be painted shall have knots and pitch streaks sealed as with untreated wood.

2.7 MISCELLANEOUS STRUCTURAL LIGHT FRAMING - #2 Southern Pine, Spruce-Pine-Fir group or other suitable commercial softwood species, S4S, kiln-dried and conforming to the following:

A.	Bending	1,200 psi
B.	Tension (Parallel to Grain)	1,050 psi
C.	Horizontal Shear	70 psi
D.	Compression (Perp. to Grain)	335 psi
E.	Compression (Par. to Grain)	1,000 psi
F.	M.O.E	1,500 mpsi

2.8 LAMINATED VENEER LUMBER

- A. Provide manufactured timber consisting of vertical 0.10 inch to 0.125 inch plys laminated together with waterproof adhesive and with all grain oriented parallel to the length of the member, such as Micro-Lam manufactured by Trus Joist Corporation or Gang-Lam manufactured by Louisiana-Pacific Company.
 - 1. Materials shall comply with a CABO Evaluation Report such as NER-126 (for Micro-Lam).
 - 2. LVL timber shall be identified by a stamp indicating the product type, CABO NER report number, manufacturer's name, plant number and the independent inspection agency's logo and evaluation report number.
 - 3. LVL timber shall have a modulus of elasticity, E, of at least 2,000,000 psi and an allowable bending stress, F_b, in tension or compression of at least 2,900 psi.
 - 4. Provide LVL in lengths suitable to span entire distance shown on plans. Do not butt splice pieces.
 - 5. Comply with manufacturer's instructions for face nailing or bolting timbers together to form larger beams and for any blocking or bracing.
- 2.9 Balance of materials shall be as specified elsewhere in this Section.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 WORKMANSHIP AND CONSTRUCTION, GENERAL

- A. All work hereunder shall be executed by mechanics skilled in the trade.
- B. Set all work plumb, level, straight and true. Secure to grounds and blocking so as to be rigid throughout. Work which adjoins other finish shall be fitted and scribed in a careful manner so as not to injure any exposed surfaces.
- C. Perform all joining and fastening in a manner to insure work remaining permanently in place and to avoid all splitting or opening of joints.
- D. Field cutting of fire retardant treated dimensional lumber and plywood. End cuts, drilling holes, and joining cuts are permitted. Do not rip or mill fire retardant treated lumber. Fire retardant treated plywood can be cut in any direction.

3.3 PRIMING AND BACKPAINTING

- A. Materials used shall comply with requirements of such materials as specified under Section 09 90 00, suitable for intended application.
- B. Except where stain or natural finish is specified, thoroughly prime all sides and edges of all lumber as soon as delivered to the site. Where material is called for to be "sealed" with a consolidant type sealer, said material shall be sealed on all faces, edges, natural and cut ends prior to placement in the work.

<u>NOTE</u>: Where fire treated lumber is employed in the work, priming and backpainting of same will not be required.

3.4 MISCELLANEOUS ROUGH CARPENTRY

- A. Contractor shall do all rough framing work in connection with installation of access doors, heating and ventilating grille, panels, roofing and sheet metal work, cabinets and mechanical trades, where required and according to conditions at the building.
- B. Do all required cutting, patching and jobbing in advance of finishing trades and work.
- C. Furnish and install wood grounds, nailing strips, cant strips, blocking and similar items wherever necessary or required throughout the buildings for support, proper erection or installation of carpentry and for the support of cabinets, shelf cleats, and all other millwork and building construction work of all other sections.

3.5 ROUGH HARDWARE

- A. Install all rough hardware for proper installation of carpentry and millwork.
- B. Hardware shall be as per Part 2 of this Section.

3.6 PLYWOOD/SHEATHING INSTALLATION

- A. Install all plywood in conformance with recommendations of the American Plywood Association.
- B. Lay horizontal plywood, good side up, with face grain perpendicular to framing. Stagger end panel joints with each panel end bearing on support. Allow 1/8 inch spacing at panel ends and 1/4 inch at panel edges unless otherwise recommended by the manufacturer.
- C. Roof sheathing shall be laid with face grain perpendicular to framing and nailed at 8 inch centers at edges and 12 inch centers in field.
- D. Sidewall sheathing shall be secured to furring assemblies and/or studs with self-drilling stainless steel screws at 8 inch centers on edges and 12 inch centers in field.

3.7 WASTE MANAGEMENT – Coordinate with Section 01 74 19

- A. Separate wood waste in accordance with the Waste Management Plan.
- B. Separate the following categories for salvage or reuse on site:
 - 1. Sheet materials larger than 2 sq. ft.
 - 2. Solid wood:
 - a. Trim longer than 16 inches
 - b. Multiple offcuts of any size larger than 12 inches
- C. Recycle the following categories:
 - 1. Clean, unpainted engineered wood products
 - 2. Clean, unpainted dimensional lumber

- D. Separate the following categories for disposal and place in designated areas for hazardous materials:
 - 1. Treated, stained, painted, or contaminated wood

End of Section

Orange-Ulster BOCES
Interior Alterations – Third Floor
Regional Education Center at Arden Hill

SECTION 062000 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all <u>finish carpentry, millwork and related accessories</u> for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:

CODE NOTES

- Fire treat all lumber and plywood exposed to view in the finished work, and as set forth in the "code" statement below as required and specified. Reference Section 099000 for field type fire treatments as and if code required.
- Further, all wood work and other applied decorative finishes exposed within the structure shall be finished and/or treated to comply with the International Building Code (2020) setting standards for Flame Spreads for use classification in accordance with Table 803.5 of the referenced code.
- NFPA 101, Section 10.2.1.1 Classification of interior finish materials shall be in accordance with tests made under conditions simulating actual installations, provided that the authority having jurisdiction shall be permitted to establish the classification of any material on which a rating by standard test is not available, unless otherwise provided in 10.2.1.2.
- NFPA 101, Section 10.2.1.2 Materials applied directly to the surface of walls and ceilings in a total thickness of less than 0.9 mm (1/28 in.) shall be exempt from tests simulating actual installation if they meet the requirements of Class A interior wall or ceiling finish when tested in accordance with 10.2.3 using inorganic reinforced cement board as the substrate material.

SCOPE NOTES:

- All casework and interior associated wood trim to be cut and fit at the millwork shop and not by finish carpenters on site; it is recognized that some work for final installation may have to be done on site, but that shall be held to a minimum. All trim to be finish nailed, countersunk and plugged to wood blocking.
- All millwork, paneling, wainscots and trim systems provided under the work
 of this Section, shall, to the greatest practicable, BE SHOP FINISHED in
 accordance with Quality Standard 1500 "PREMIUM" using the systems
 specified in this Section as applicable for the intended usage.
- Unless specified to the contrary, the core/platform for millwork items, shelving and the like, other than countertops, shall be "mill option" using plywood, solid stock, medium density fiberboard, water-resistant medium density particle board, agrifiber and the like with no added ureaformaldehyde.
- 1. Provide millwork pantry cabinets construction for the Copy room #415

- 2. Provide 5/4" Oak window stools with aprons at all new window locations, per typical details in drawings.
- 3. Provide all required labor, miscellaneous rough and finish hardware, blocking, shims and the like in connection with the receiving, storing and setting of Finish Hardware, Toilet Accessories, Miscellaneous Specialties and such other "vendor" supplied items customarily installed under the work of this trade.
- 4. Provide all finish trim in buildings including chair rails, wall caps, casings; stools; aprons; picture moulds; and the like. Further, remove existing window stools in all areas of work and provide new oak window stools/aprons.
- 5. Provide all fasteners, anchorage items and rough hardware required for the work of this Section whether or not specified in detail.
- 6. Perform all priming, backpainting, shop coating, and the like in conjunction with the work of this Section.
- 7. Provide all other labor, materials, equipment, and accessories and other items necessary to make the work of this Section complete.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above.

1.4 QUALITY ASSURANCE

A. Certification: Work in this Section shall be performed by a firm licensed by the AWI Quality Certification Program and "Certified by Forest Stewardship Council". Project shall be filed with both AWI and FSC immediately upon award and evidence of this filing shall be made as part of the submittal process.

Work in this Section shall comply with the specified grade(s) of work and section(s) of the current edition of the Architectural Woodwork Institute quality standards. Woodwork manufacturers shall be licensed by AWI as competent to perform the work specified. Certification shall be evidenced through the application of AWI quality certification labels and/or the issuance of an AWI letter of licensing for the project. Certification labels shall be applied to each item of work.

- B. AWI Quality Standards
 - 1. All work shall comply with applicable requirements of the AWI "Architectural Woodwork Quality Standards, 8th Edition, Version 2.0, 2006" and specific grading standards set forth within this Section.
 - 2. Affix the AWI Quality Grade Stamp to each unit of product. Stamp shall display "Grade" as specified for each section of the work.
 - 3. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.
 - 4. Provide AWI Quality Certification Program certificates indicating that woodwork [including installation] complies with requirements of grades specified. This project has been registered as AWI/QCP Project No. ____. OR, the Contractor, upon award of work shall register the work under this section of the AWI Quality Certification Program, (800) 449-8811.
- C. Fabrication and Installation Qualifications: Firm which can demonstrate a

minimum of 3 years of successful experience in fabricating and installing woodwork items similar in type and quality to those required for this project.

- D. Reference Standards: All materials used for work of this Section shall conform with Voluntary Product Standards and trade Association Units as follows:
 - 1. Northeastern Lumber Manufacturer's Association Inc. (NELMA); Southern Pine Inspection Bureau (SPIB); Western Wood Products Association (WWPA).
 - 2. American Plywood Association (APA); Douglas Fir Plywood Association (DFPA).
 - 3. Architectural Wood Work Institute (AWI)
 - 4. American Society for Testing and Materials (ASTM).

E 84 Fire Resistance

- 5. American Wood Preservers' Association (AWPA)
 - C2 Preservative Treatment by Pressure Processes.
 - C20 Fire Retardant Treatment by Pressure Process
- 6. Applicable Federal Specifications for fasteners, bolts, nails, screws, etc.
- 7. American National Standards Institute (ANSI) A135.4Basic Hardboard
 - A208.1 Mat Formed Wood Particle Board
- 8. National Electrical Manufacturers Association (NEMA).
- 9. Builders Hardware Manufacturers Association (BHMA) A156.9 Cabinet Hardware
- Hardwood Plywood & Veneer Association (HPVA)
 HP American Standard for Hardwood and Decorative Plywood
- 11. National Hardwood Lumber Association (NHLA)
- 12. Underwriters' Laboratories, Inc. (UL).
- 13. Structural standards as set forth by National Forest Products Association (NFPA)
- New York State Building Code.
- E. Further, requirements given herein may be affected by other related requirements of the project specifications. Correlation of the contract requirements is the responsibility of the Contractor.
- F. In compliance with the SED Manual of Planning Standards, Part II, Section S202, all materials incorporated in the work of this Section shall comply with the following:
 - 1. Class A, Flame Spread 0-25 interior finish shall be mandatory in corridors; passageways; stairs; exit ways; kitchens; maintenance, repair and custodial areas; trim/paneling systems in places of public assembly.
 - 2. Class C, Flame Spread Less than 200 interior finish is mandatory in all instructional and office spaces.

In any case, regardless of the flame spread classification, no material having a smoke developed rating of 450 or more may be used in any area of work on this project.

1.5 SUBMITTALS – Coordinate with Section 013300

 Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.

- As set forth in Sections 013300 and 013200, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Shop Drawings showing location of each fabricated item along with dimensioned plans and elevations; large scale details, jointing and profiles; attachment devices; material listing; finish designations; accessories and other components.
 - 1. Identify woodwork item using same identification system shown on Architectural Drawings.
 - 2. Coordinate details and cutouts to accommodate accessories specified under other Sections.

Prepare drawings to a minimum scale of 1-1/2 inches to 1 foot.

- B. Samples including -
 - 1. Wood Trim: 2 pieces, 12 inches long of each type and finish.
 - 2. Finish Plywood: 2 pieces, 8 inches by 10 inches for each type required illustrating grain and specified finish.
 - 3. Counter Tops: 1 piece, 12 inches long, complete unit.
 - 4. Anchorage devices to be used in the work of this section, 2 each.
 - 5. All cabinet finish hardware, each item. Linear samples 12 inches. Piece items, 2 each.

All other items as deemed necessary by the Architect.

- C. Product Data: Submit manufacturer's or supplier's product data for each product and process specified as work of this Section and incorporated into items of finish carpentry.
- D. Certification of specification compliance for all work including:
 - 1. Quality Certification: Submit woodwork Manufacturer's (Fabricator's) certification, stating that fabricated woodwork complies with AWI quality grades and other requirements indicated herein.
 - 2. Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storing, installation, and finish of treated material.
 - 3. Fire Retardant Treatment: Provide certification by treating plant that treated materials comply with requirements.
- E. This Contractor shall take all necessary field measurements prior to fabrication and installation of work and shall assume complete responsibility for accuracy of same.
- F. Material Safety Data Sheet (MSDS) must be submitted for each product.
- 1.6 ENVIRONMENTAL, STORAGE AND HANDLING REQUIREMENTS AND RESTRICTIONS (Coordinate with Section 016100)
 - A. Deliver all materials to the job site clearly labeled as to product, manufacturer, color and/or other pertinent characteristics.
 - B. Protect millwork against dampness. All materials shall be stored flat and level in a

- fully enclosed space. **Do not store seasoned materials in wet or damp portions of buildings.**
- C. Millwork and trim installations shall be done only when the temperature and humidity closely approximate the interior conditions that will exist when the building is occupied. The heating and cooling systems shall be operating before, during, and after installation, with the humidity of the interior spaces maintained between 25% and 55%.
- D. Acclimate all materials, millwork and trim for a minimum of 72 hours immediately prior to installation.
- E. Store materials a minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
- F. Store doors under cover, stacked substantially upright on wood strips and with spaces between doors to assure drainage of condensation and ventilation of all surfaces.
- G. Protect fire retardant materials against high humidity and moisture during storage and erection.

1.7 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

- A. Grading and Fabrication: AWI Quality Standard 100 "CUSTOM" and graded as I, II or III as applicable to intended use.
- B. Moisture Content: 6 to 8%.
- C. Sizing: Surface lumber 4 sides as per Simplified Practice Recommendations PS16. latest edition.
- D. Species:
 - 1. Hardwoods
 - a. Natural Plain Sliced Red Oak
 - b. Painted Poplar
 - 2. Softwoods Eastern White Pine

2.2 SHEET MATERIALS AND PANELS

- A. Grade panel products in accordance with AWI Quality Standard 200 for "Grade of Work" specified.
- B. Flush Wood Panel Systems as per AWI Quality Standard 500A graded as "CUSTOM" and composed of hardwood plywood graded for I Transparent.
 - 1. Grade all exposed surfaces as "A" GRADE" quality face veneer as defined by the Hardwood Plywood & Veneer Association (HPVA).
 - 2. All semi-exposed surfaces shall have "B" Grade face veneer.
 - 3. All concealed surfaces shall have veneer facing graded at the Option of the fabricator.
 - 4. Thickness minimum 5/8 inch [16 mm].
 - 5. Core Mill Option .
 - 6. Face Veneer Plain Sliced Red Oak.
- C. Particle Board: Minimum 48 pound density; Grade 1-M-2 conforming to ANSI A161.1 and 161.2. Provide "water resistant" or "fire retardant" material each as required by conditions of use and in accordance with governing Codes. All such boards shall be urea-formaldehyde resin free; and shall, to the greatest extent practical, be fabricated from post consumer waste products.
- D. Medium Density Fiberboard (MDF)
 - 1. Interior Usage: Industrial grade with a formaldehyde free binder exceeding the requirements established in ANSI A208.2, Product Class MD-Interior for use in fabrication of millwork items at option of fabricator. Provide "fire retardant" material as required by conditions of use and in accordance with governing Codes.
- E. Hardboard: tempered, SIS, Class 1, minimum 1/4 inch and shall conform to PS 58-73.
- F. Hi-Density Particle Board: Similar and equal to Resincore II, 62 pound density urea impregnated material for use as counter tops where marked as "Opaque" may be used as an alternative to "MDF" as above.

2.3 PLASTIC LAMINATE MATERIALS

- A. Materials, General: High pressure laminated material conforming to NEMA standards for intended locations as follows.
 - GP-50 for horizontal surfaces. Substitute FR-50, fire rated material in areas requiring rating in accordance with code statement contained in Part 1 above
 - 2. GP-28 and PF-30 for exposed vertical surfaces. Use "PF-30" material for all post forming work requiring 3/8 inch or greater radiused edges.
 - 3. CL-20 for cabinet liners.
 - 4. Backer 20 for backing/balancing of assembled panels.
- B. Colors and Finishes Vertical surfaces- Formica Sarum twill 8827-58
- C. Approved Manufacturers
 - 1. General Laminates Formica; Wilsonart International; Panolam Industries; Micarta: Pionite
 - 2. Custom Laminates including "chalkwall" surfaces Abet
- D. Adhesives as recommended by the manufacturer for intended product and substrates encountered.
- E. Fabrication and application of plastic laminate shall be in accordance with industry standard practices, conditions, procedures and recommendations as set forth in NEMA LD 3-85 and AWI 200/400 as well as ANSI 161.2, MOST RESTRICTIVE shall govern. Store products in accordance with manufacturer's requirements and

preconditioned prior to application and/or assembly of panels for a minimum of 48 hours at 75F and 50% RH.

F. Construction - as shown on the drawings.

<u>Note</u>: Factory seal/prime bottoms of all particle board units as well as all raw or cut edges of substrate materials with pigmented polyurethane or varnish.

- 2.4 GLUES AND ADHESIVES See Section 06 10 00
- 2.5 ANCHORAGE AND FASTENERS
 - A. Size anchorage items to meet requirements and conditions at the site and shall be as set forth in Section 06 10 00 as if restated herein in full and shall be as applicable for intended usage.
 - B. Fasteners shall be of size and type to suit application.
 - 1. Interior: All Stainless Steel
 - 2. Exterior: Stainless steel for all locations
 - 3. Concealed joint fasteners shall be of threaded steel or other patented type assembly.

2.6 ACCESSORIES

- A. Casework and Molding Trim Systems:
 - 1. Polyethylene "T-Molding" trim in solid color as selected by the Architect.
 - 2. "Heat Set" polyvinylchloride moldings as standard in the industry in solid color as selected by the Architect.
- B. Panel anchor system shall be an extruded aluminum "mated spline" system as manufactured by Monarch Metal Fabrication, Inc. (631-563-8967).
- C. Glass: As specified in Section 08 80 00.
- D. Brackets: "Work Station Brackets" by A&M Hardware fabricated from 1/8 inch steel, fully welded and rated for 1000# loading. Unit assemblies shall be prefinished with textured powder coat in manufacturer's standard colors.
- 2.7 PRESERVATIVE & FIRE TREATMENT as per Section 06 10 00 as if restated herein in full and shall be as applicable for intended usage.
- 2.8 HARDWARE For purposes of establishing standards of quality and levels of performance, casework hardware shall be similar and equal to one of the following:
 - A. Pulls: Mockett Rounded Square pull #1099-SS Platinum
 - B. Drawer Slides: Accuride #2632
 - C. Hinges: Stanley #1500 Series, concealed self closing casework hinges.
 - D. Catch: 7/8 inch diameter cylindrical magnetic.
 - E. Removable panels: 3M invisible nylon fastener.
 - F. Plug-in shelf brackets; standard pin design.
 - G. Recessed shelf standards: Aluminum, KV #255 with #256 matching brackets and cross shelf supports.
 - H. Continuous hinges: Soss
- 2.9 SHELVING Coordinate with AWI Quality Standard 600 "CUSTOM" for all work. Provide 4 H x 15"d x 1"thick on walls as indicated on drawings in Room 409a,409c, 411b, 411c, 415a and 416a.
 - A. Plywood APA-B/B with birch edging.

- B. Wood veneer plywood core platform with ploughed in hardwood edging; groove shelving on top and bottom (opposite) to allow for flat setting into brackets.
- C. Millwork elements with let-in ends fabricated from veneered plywood or particle core stock with let-in edging. Species as per Paragraphs 2.01 and 2.02 herein.

2.10 ADJUSTABLE SHELVING STANDARDS AND BRACKETS

A. Shelf standards and companion brackets for adjustable shelving systems shall be of design suitable for intended loading and as manufactured by:

Manufacturer	Normal Loading	Medium/Heavy Loading
Garcy Corp	649/668	1204/1237 w/1173 clips
Knape & Vogt	83-161LL	87-187 w/212 clips

Space standards at 16 inches on center; coordinate with Section 09 29 00 for blocking and stud spacing.

B. Finish: White

2.11 STANDING AND RUNNING TRIM SYSTEMS

- A. Accomplish all work involved herein in accordance with AWI Quality Standard 300, "Custom" fabrication.
- B. All trim elements required for the work of this Project shall be of suitable species as specified in Paragraph 2.01 of this Section for respective finish.

2.12 CASEWORK FABRICATION

- A. All cabinetwork shall comply, as a minimum, to the requirements of the Quality Standards of the Architectural Woodwork Institute (AWI), Sections 400 or 1600 "Modular Cabinets" for "Custom" Grade, except as otherwise specified or indicated on the drawings shall apply by reference and are hereby made a part of this Specification. Attention is directed to Part 1 of this Section for Certification requirements..
- B. Construction: Flush overlay OR as may be detailed on the drawings.
- C. Materials/Panels Reference Paragraphs 2.01 and 2.02 herein for panels and solid stock species and grade.
- D. Cabinet Bases/Toe Kicks Lumber, **not subject to mill option.**
- E. Finish of exposed surfaces:
 - 1. Laminated Finish as per Paragraph 2.03 above.
 - 2. Natural Finish AWI 1500 Conversion Varnish, medium rubbed
- F. Semi-exposed surfaces: Balance sheet on door backs; quality standards govern balance of work.

2.13 SOLID COUNTER SURFACING

- A. Material for use for selected counter tops/splashes shall be a solid material of homogeneous composition suitable for intended use and shall be DuPont "Corian", Color: Everest
- B. Material shall be 1/2 inch (12.8 mm) thick 100% homogeneous filled acrylic material meeting ANSI Z124.6 Type 6; build up edge as shown on drawings. NOTES:

- The following guidelines and general requirements apply to DuPont SSM, in addition to granite, marble, or any other solid surface materials specified or selected; except fabricator and installer are to be thoroughly experienced and Certified in commercial foodservice installation of granite, marble, or other solid surface material specified or selected. Comply with N.S.F. Standard No. 51; Acrylic adhesive is to be used for all joints.
- Install directly over 3/4 inch (19 mm) thick (minimum) substrate of close grained plywood of selected, smooth, sanded stock to ensure a smooth ripple-free surface; or commercial grade furniture particle board or MDF.

2.14 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 8 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. 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):
 - 1. Wood Glues: 30 g/L.
 - 2. Contact Adhesive: 80 g/L.

2.15 FABRICATION REQUIREMENTS

- A. Interior Woodwork Grade: Provide AWI Premium grade interior woodwork complying with the referenced quality standard.
- B. 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.
- C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- D. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.
- E. 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.
- F. 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. OPENING SHALL BE SHOWN ON THE SHOP DRAWINGS PRIOR TO FABRICATION. Sand edges of cutouts to remove splinters and burrs.
- G. Seal edges of openings in countertops with a coat of varnish.
- H. The millwork contractor is responsible for all AV, telephone, data, security, and electrical penetrations in millwork. The electrical and AV contractors are to coordinate number, location, and type of penetrations with the millwork contractor.

- I. Install glass to comply with applicable requirements in Section 08 80 00 GLAZING and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.
- J. Miscellaneous Metals. The millwork contractor is responsible for the coordination, location, requirements and installation of the metal supports and brackets provided by others incorporated in the Work of this Section, including any fasteners or materials required for installation.
- 2.16 Balance of materials shall be as specified elsewhere in this section.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 WORKMANSHIP AND CONSTRUCTION, GENERAL

- A. All work hereunder shall be executed by mechanics skilled in the trade. Construction and finishing of millwork shall be specially and carefully done by experienced journeymen.
- B. All finish work shall be assembled and finished at the shop, as far as practicable, and delivered to the site ready to be set in place.
- C. Work shall be set plumb, level, straight and true. Secure to grounds and blocking so as to be rigid throughout. Work which adjoins other finish shall be fitted and scribed in a careful manner so as not to injure any exposed surfaces.
- D. Install running and other finish trim with tight joints. Secure with finishing nails, except as otherwise specified. Set exposed heads of nails for putty where in "painted surfaces"; do not fill where "stained" finish is noted. Sand as necessary to remove irregularities and tool marks. Leave work free from defects and blemishes and in proper condition to receive specified finishes.
- E. Joints shall be tight and formed to conceal shrinkage. Corners shall be mitered unless otherwise shown.
- F. Running trim shall be in long lengths and jointed only where solid fastening can be made. End joints in built-up members shall be well distributed. Miter exterior corners and cope interior angles. Where required, carefully scribe woodwork to other adjacent work.
- G. Perform all joining and fastening in a manner to ensure work remaining permanently in place and to avoid all splitting or opening of joints.

3.3 PREPARATION FOR PAINTER'S FINISH

A. Clean, smoothly dress, and sandpaper all exposed surfaces. No plane or tool marks shall show. Further dress all exposed surfaces of interior finish woodwork with fine grit sandpaper or steel wool, to smooth and clean surfaces. Deeply set nails and screws for putty stopping or plugging as specified.

3.4 PRIMING AND BACKPAINTING

A. Materials used shall comply with the requirements of such materials as specified under "Painting" Section.

- B. Priming: Except where stain or natural finish is specified, thoroughly prime all sides and edges of all interior finishing lumber as soon as delivered to the site. Prime all millwork which is assembled or built up of more than one piece in the woodworking mill before material is fabricated or built up.
 - Trim elements scheduled to be natural finish and <u>not</u> factory finished shall be clear sealed immediately upon receipt on site to insure integrity of wood and profiles prior to erection and final finishing.
- C. Backpainting: No interior millwork or trim shall be installed until all surfaces in contact with masonry or plaster, or concealed in finished work, have been backpainted with a heavy coat of alkyd paint.

3.5 INSTALLATION - ARCHITECTURAL WOODWORK

A. All paneling, trim, cabinets, casework and the like shall be installed in accordance with requirements set forth in AWI Quality Standard 1700 for "Custom" work as outlined under 1700-S-1, S-2 and S-3 standards for preparation, alignment, securement, joinery and the like not withstanding any statements made within this section to the contrary.

3.6 PLASTIC LAMINATE AND SOLID SURFACING SYSTEMS INSTALLATION

- A. Material and adhesive shall be as specified in Part 2 of this Section.
- B. Contractor shall protect the material from damage by other contractors or materials. At completion and final acceptance of work, the protection shall be removed and work left in whole and perfect order.
- C. Openings in counter tops for sinks shall be cut by this Contractor and shall conform to the size and shape of sinks furnished under "Plumbing". Metal frames, if required, at sinks will be furnished and installed under "Plumbing".
- D. Overall installation requirements shall be governed by AWI Quality Standard Section 1700 for "**Custom**" grade operations.

3.7 HARDWARE AND ACCESSORIES - Coordinate with Section 08 71 00

- A. Receive, store and be responsible for all hardware and accessories furnished by others. Properly tag, index and file keys in key cabinet at completion of work and so deliver to the Architect.
- B. Fit all hardware accurately, apply securely and adjust carefully. Leave in working order, free from defects.
- C. Center door knobs centered 38 inches above floor and center of door pulls 45 inches above floor unless otherwise indicated on drawings. Leave in working order, free from defects. Mount knobs and pulls as required for barrier free access, if different heights.
- D. Contractor shall be responsible for condition and operation of all finished Hardware until issuance of Certificate of Final Acceptance.
- E. Installation of Electronic Hardware: Comply with manufacturer's instructions for wiring, grounding, and shielding.
- F. Field Quality Control of Electronic Hardware: Supplier of electronic hardware to make a visit to jobsite at the request of Architect or Contractor for the purposes of monitoring compliance with manufacturer's installation requirements
- G. Demonstration of Electronic Hardware: Demonstrate installed equipment and train owner's employees in its use and intended function.

3.8 PREFABRICATED CASEWORK/CABINETS

- A. Receive, store and set all prefabricated or vendor furnished cabinetry fabricated under AWI Quality Standard 1600 including all accessory items all as furnished, required and/or detailed.
- B. Furnish and install all necessary grounds and blocking for installation of cabinet work.
- C. Take all necessary care and precautions to protect finish cabinet work from damage by others.

3.9 ADJUSTABLE SHELVING STANDARDS

- A. Install adjustable shelving standards and brackets on walls and partitions where indicated. Coordinate with drywall construction for location of reinforcing.
- B. Standards shall be toggle or expansion bolted to masonry and screwed through drywall construction into wood blocking or steel strapping. Coordinate with Sections 04 20 00 and 09 29 00.

3.10 SETTING OF SADDLES

- A. Set saddles perfectly in full bed of Type VI caulking compound as specified in Section 07 90 00, secure with not less than three flathead countersunk screws driven into lead expansion shields.
- B. Extend saddles across the full width of the door openings in a single piece, neatly fitted to jamb and properly fitted and cut for hardware. Provide cover plates for hardware.

3.11 PROTECTION

- A. Protect all new construction, adjacent work and finished work from and damage. PROVIDE DROP CLOTHS OR OTHER SUITABLE PROTECTIVE COVERINGS IN ALL AREAS OF THE WORK.
- B. Damage caused by the handling, storing or application of materials or the failure to provide adequate protection shall be repaired or replaced at no additional cost to the Owner.

3.12 ACCEPTANCE AND PATCHING

- A. On completion of work, all equipment and rubbish resulting from the work of this section shall be removed from the premises.
- B. Leave work clean, whole, and sound ready for additional finish or sealing as specified and/or as shown on the drawings.
- C. Clean all glass, doors, frames, and accessories free of dirt and other foreign materials after completion of installation.

3.13 WASTE MANAGEMENT

- A. Separate wood waste in accordance with the Waste Management Plan.
- B. Separate the following categories for salvage or reuse on site:
 - 1. Sheet materials larger than 2 sq. ft.
 - 2. Solid wood:
 - a. Trim longer than 16 inches
 - b. Multiple offcuts of any size larger than 12 inches
- C. Recycle the following categories:
 - 1. Clean, unpainted engineered wood products

- 2. Clean, unpainted dimensional lumber
- D. Separate the following categories for disposal and place in designated areas for hazardous materials:
 - 1. Treated, stained, painted, or contaminated wood

End of Section

SECTION 072100 - INSULATION

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all insulation work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - 1. Provide spray foam insulation at all metal framed exterior walls and soffits throughout the project.
 - 2. Pack voids in or around windows, door frames, nested studs, etc, coordinate with Sections 08 11 00, 08 40 00, 08 51 10 and 09 29 00.
 - 3. Provide semi-rigid insulation systems at spandrels. Mechanical securement.
 - Provide foamed in place urethane insulation at all window gaps, door surrounds, electrical devices, sleeves and the like in exterior wall construction. Include all penetrations of rigid insulation and behind all electrical boxes located in exterior walls – WORK TO BE ACCOMPLISHED UNDER SECTION 07 26 00.
 - 5. Furnish and/or provide balance of all required insulation systems necessary to complete the work and/or shown on the drawings.

NOTES:

- Insulation required within nested or enclosed stud spaces of light metal framing shall be accomplished as part of the work of that Section with unfaced batt type material at interior or spray foam insulation at exterior as specified in this Section.
- All insulation systems provided as part of the work of this Contract shall be in required thickness to insure full compliance with energy code requirements as promulgated by the State of New York. As part of the responsibilities of the Contractor, he shall provide a schedule of insulation's, their independent aged "R" values and the overall "R" values of the proposed assemblies. This shall be provided prior to start of any insulation work.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above.

1.4 QUALITY ASSURANCE

- A. Thermal insulation materials, forms, properties, terms and the like shall be as established under ASTM Reference Standard C 168-80a "Standard Definitions of Terms Relating to THERMAL INSULATION MATERIALS". Resistance ("R") values listed are minimum "aged" requirements.
- B. All insulation materials shall be properly identified on the package with the manufacturers' name and "R" value, and shall indicate the fiber material.
- C. References

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- 1. ASTM C 612: Specifications for Mineral Fiber Block and Board Thermal Insulation.
- 2. ASTM C 665: Specification for Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- 3. ASTM E 84: Test method for Surface Burning Characteristics of Building Materials.
- 4. ASTM E 90: Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- 5. ASTM E 199: Method of Fire Tests of Building Construction and Materials.
- 6. ASTM E 136: Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.
- 7. ASTM E 413: Classification for Rating Sound Insulation.

D. Regulatory Requirements:

- 1. Fire Performance Characteristics: Provide insulation materials whose fire performance characteristics have been determined in accordance with ASTM test method indicated below, by testing organizations acceptable to regulatory agencies having jurisdiction.
 - a. Surface Burning Characteristics: ASTM E 84.
 - b. Fire Resistance Ratings: ASTM E 119.
 - c. Combustion Characteristics: ASTM 136

In all cases, materials have a smoke developed rating of less than 50.

E. Control Submittals

- 1. Test Reports: Submit certified test reports indicating compliance with material reference standard indicated for material performance characteristics and physical properties.
- 2. Certificates: Submit product certificates, signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.

1.5 SUBMITTALS – Coordinate with Section 01 33 00

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Product Data: Submit data on product characteristics, performance criteria, and limitations, including the following:

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- 1. General installation/application instruction.
- 2. Environmental conditions required for installation and installation techniques.
- 3. Safety requirements for application of products.
- B. 12 inch square pieces of all materials to be incorporated in the work, as and if requested by Architect.
- C. Mechanical fasteners, adhesives and the like.
- D. Schedule of insulation locations.
- E. Certification of specification compliance.
- F. Material Safety Data Sheet (MSDS) must be submitted for each product.
- G. Installer's/Applicator's Qualifications: Submit copy of Installer's/Applicator's certification from manufacturer.
- H. Warranty: Submit manufacturer's standard one-year warranty against defects in material or manufacturing.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)

- A. All materials shall be delivered to the job site in unopened factory sealed packaging, clearly labeled as to product, manufacturer, values and other pertinent characteristics and stored under conditions as recommended by the manufacturer.
- B. Store and protect products in accordance with manufacturer's instructions. Store with seals and labels intact and legible. Store inside and in a dry location. Protect insulation materials from moisture and soiling. Provide ventilation to prevent condensation and degradation of products.
- C. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
- D. Coordinate installation with other trades whose work may be affected or have an effect on the work herein.
- E. Store weather barrier materials as recommended by weather barrier manufacturer.

1.7 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 BATT TYPE INSULATION

A. All insulation shown on drawings or specified herein shall be "Johns Manville

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Unfaced Formaldehyde-free Thermal and Acoustical Fiber Glass Insulation" and shall be in thicknesses to produce Thermal resistance "R" (RSI) values as specified in Part 1 of this Section. Products by CertainTeed; OwensCorning; Knauff or approved equal and shall be suitable type to permit installation into framing system shown.

2.2 RIGID INSULATION

A. Rigid insulation shall be similar and equal to Owens Corning "700 Series, Product 705" insulation in a single foil faced thickness yielding an "R" factor as specified on drawings with a flame spread of 25 and smoke development of 50.

2.3 SPRAY INSULATION MATERIALS

- A. SPF (Sprayed Polyurethane Foam) Sealant: closed cell, foamed-in-place, zero ozone depletion formulated polyurethane foam with the following characteristics; material shall be similar and equal to that manufactured by NCFI Polyurethanes; Mount Airy, NC:
 - 1. Density: 2.0 PCF.
 - 2. Flame Spread (ASTM E 162): 25 or less.
 - 3. Aged R-Value (at 1 inch): Not less than 6.8.

2.4 SEMI-RIGID INSULATION

- A. Semi-Rigid insulation shall be one of the following "mineral wool" type materials and shall be installed with combination of adhesive and mechanical fasteners.
 - 1. Adhesive as recommended by the manufacturer for intended application.
 - 2. Fasteners: design of size and type to fit installation and equipped with a non thermally bridging washer.

Material shall be a mineral wool fiber system made from basalt rock and slag resulting in a non-combustible product with a melting point of approximately 2150°F (1177°C) and shall be similar and equal to that as manufactured by ROXUL, Inc. and shall conform to the following properties:

ASTM C 612	Mineral Fiber Block and Board Thermal	Complies
ASTM E 814	Insulation Type IVA Standard Test Method for Fire Tests of Through-Penetration Fire Stops	Passed
ASTM E 136	Behavior of Materials @ 750°C (1382°F)	Non-Combustible
ASTM E 84(UL 723)	Surface Burning Characteristics	Flame Spread = 0; Smoke Developed=0
ASTM C 1104	Moisture Sorption	0.04%
ASTM E 96	Water Vapor Transmission, Desiccant Method	1895 ng Pa.s.m2
ASTM C 356	Linear Shrinkage	< 2% @ 650°C (1200°F)
ASTM C 518	R-value @ 24°C (75°F)	4.2/inch

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ASTM C 665 Corrosiveness to Steel	Passed	
Density	ASTM C 303	4.5 lbs/cu.ft.
Compressive Strength @ 10%@ 10%:	144 psf (6.9 kPa)	

OR

Material shall be a mineral wool fiber system made from basalt rock and slag resulting in a non-combustible product and shall be similar and equal to that as manufactured by Thermafiber, Inc. and shall conform to the following properties:

Surface Burning Characteristics	ASTM E84	Flame = 0/Smoke
		= 0
Density	ASTM C303	8 lbs/cu.ft.
Thermal Conductance	ASTM C518	4.3/inch
ASTM C 612	Mineral Fiber Block and	Complies
	Board Thermal Insulation	
	Type IVA	
ASTM E 96	Water Vapor	.02 Perm
	Transmission, Desiccant	
	Method	

2.5 ACCESSORIES

- A. Stick-clips shall be of self-stick design with lock washer or pressure tab and shall be of standard manufacture.
- B. Joint sealant tape: pressure sensitive design compatible with facing material.
- C. Fasteners: Plated steel staples, plastic tape, and other fastening devices required to ensure tight fitting insulation.

2.6 SEALING FOAM

A. Single component expanding, moisture cure, polyurethane foam sealant similar and equal to "Expanding Foam Sealant" by Geocel Corporation and conforming to the following technical performance data:

Technical Data	Test Method	Result
Thermal Conductivity	ASTM C 518	0.22 to 0.26
Thermal Resistance	R-Value	3.8 to 4.5
Compressive Resistance	ASTM C 1621	8.7% @ 10%
		Deformation
Density	ASTM D 1622	0.94 to 1.6 lbs/ft
Water Absorption	ASTM D 2842	0.30%
Flame Spread	UL	5
Smoke Developed	UL	20

2.7 Balance of materials shall be as specified elsewhere in this Section.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

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A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 BATT INSULATION SYSTEMS

- General: Install building insulation to comply with thermal and/or acoustical/sound control requirements. Fit insulation to areas and conditions required, without voids.
 - 1. Fit insulation to form a complete insulation blanket around indicated areas so as to maintain integrity of insulation over entire area to be insulated.
 - 2. Position flanged blankets as recommended by manufacturer for application and secure to framing with recommended fasteners. Tightly butt to insure full contact.
 - 3. Position vapor retarders on inside (heated side in winter) of insulation blanket.
 - 4. Coordinate insulation installation over or within 3 inches of lighting fixtures, fans, or other heat-generating electrical devices with manufacturer's recommendations and regulations of authorities having jurisdiction.
- B. Carefully cut insulation and fit around pipes, conduits, and other obstructions.
- C. Where pipes or conduits are located in stud spaces, place insulation between exterior wall and pipe.
- D. At soffits, place, vapor barrier to the warm side, on (wire lath and suspension system furnished under Section 09 21 13) (suspension system furnished under Section 09 29 00). Joints shall be taped with approved sealant tape so as to effect tight seal.
- E. Tape insulation on the side facing exterior with sealing tape as recommended by the manufacturer of the insulation so as to insure complete seal from leakage.

3.3 SEMI-RIGID/RIGID INSULATION

A. All insulation shall be placed with mechanical fasteners of size and type suitable for installation.

3.4 SPRAY FOAM INSULATION

- A. Prepare substrate per manufacturers requirements. Clean surfaces throughly prior to installation.
- B. Gaps and/or voids in substrate shall be covered with approved transition membrane, backer fill, back board, or mineral wool fit in the void as required by manufacturer.
- C. For metal stud walls, install required transition membranes around corners, openings, and wall penetrations for plumbing, electrical, HVAC equipment.
- D. For CMU walls, use transtions membranes to seal junctions of dissimilar materials, such as window framing, etc. Do not apply transition membranes at wall corners or cahnges of plane where the masonry/concrete is continuous. Back material covered with transition membrane can be used to bridge between two masonry/concrete walls constructed independent of each other.
- E. Mask adjacent materials as required to prevent overspray.
- F. Apply SPF directly to substrate in accordance with manufacturers installation instructions. Multiple layers of foam may be applied as required to achieve the required thickness. Total thickness to any area must be applied on the same day.

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G. All surfaces to be sprayed with SPF must be free of all forms of moisture and ice prior to application. Do not apply SPF during inclement weather or when ambient temperature and humidity are outside the ranges prescribed by the manufacturer.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.6 PROTECTION AND CLEANUP

- A. Protection: Protect installed products from damage during construction operations until final completions.
- B. Clean up, remove and dispose of excess materials, litter and debris; leave all work areas in a clean condition.

3.7 WASTE MANAGEMENT – Coordinate with Section 01 74 19

- A. Plan and coordinate the insulation work to minimize the generation of offcuts and waste. Reuse insulation scraps to the maximum extent feasible.
- B. Separate and recycle waste materials in accordance with the Waste Management Plan and to the maximum extent economically feasible.
- C. Reuse insulation scraps in attic areas or other locations where out of view.

End of Section

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SECTION 078100

APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete provision of all fireproofing on the following areas:
 - 1. Entire underside of existing roof / floor construction above third floor
 - 2. All existing steel columns at the entire third floor
 - 3. <u>Bottom flange of existing steel beams at the entire third floor and all new</u> structural steel framing
 - 4. Patching of existing fireproofing that is damaged or disturbed during the alteration/reconstruction work and areas with missing fireproofing in the area of work.
- B. Field verify existing conditions and prepare substrates and surfaces for application of new fireproofing materials per manufacturer's requirements.
- C. The application of material thickness shall be as required to maintain the building code classification as noted on the drawings.
- D. Contractor shall allow for two separate mobilizations in order to complete the scope of work within this section due to phasing and coordination with work in other sections including, but not limited to, demolition, HVAC, electrical, plumbing, metal framing, and finishes.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification.

1.4 QUALITY ASSURANCE

- A. Requirements given herein may be affected by other related requirements of the project specification. Correlation of contract requirements is the responsibility of the Contractor.
- B. All materials used in the work of this Section shall be FORMULATED WITHOUT ASBESTOS AND SHALL BE SO CERTIFIED BY THE CONTRACTOR in accordance with OSHA 29 C.F.R. Section 1926.58.
- C. Qualifications
 - 1. <u>Product Qualifications</u>: The manufacturer of the material shall have Underwriters Laboratories Inc. approval for the fireproofing ratings and applications specified.
 - 2. <u>Contractor's Qualifications</u>: The Contractor shall be licensed for this type of work by the manufacturer of the fireproofing materials. He shall use materials and application equipment approved by this manufacturer.

D. Coordination

 Cooperate and work in harmony with firms doing the work of all other sections, allow them access to the work under this section and afford them all reasonable opportunities for the installation of their work and the storage of their materials.

- 2. Arrange and carry on the work of this section in such a manner as not to unnecessarily delay or hinder the work of any other section.
- 1.5 SUBMITTALS Coordinate with Section 013300
 - Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
 - As set forth in Sections 013300 and 013200, prepare and submit a fully developed submittal schedule; note review times set forth in Section 013300 are deemed "average", for large submissions allow longer review times.
 - The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
 - A. Schedule of thickness for intended material.
 - B. Certification of Specification Compliance.
 - C. Materials proposed for use in fireproofing along with test data showing conformance to minimum property standards set forth in Part 2 herein.
 - D. Test Data: Independent laboratory test results for fireproofing shall be submitted for the following performance criteria:
 - 1. Bond Strength per ASTM E 736
 - 2. Compressive Strength per ASTM E 761
 - 3. Deflection per ASTM E 759
 - 4. Bond Impact per ASTM E 760
 - 5. Air Erosion per ASTM E 859
 - 6. Corrosion Resistance per ASTM E 937
 - 7. Abrasion Resistance (Test Method developed by City of San Francisco, Bureau of Building Inspection)
 - 8. Impact Penetration (Test Method developed by City of San Francisco, Bureau of Building Inspection)
 - 9. High Speed Air Erosion per ASTM E859
 - 10. Surface Burning Characteristics per ASTM E 84
 - 11. Combustibility per ASTM E 1354 Cone Calorimeter
 - 12. Mold Resistance per ASTM G 21
 - E. Material Safety Data Sheet (MSDS) must be submitted for each product.
- 1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)
 - A. Fireproofing materials shall be delivered to the project site in sealed paper bags, or other suitable containers, properly identified and labeled so as to indicate approval of materials by the Underwriters' Laboratory under procedures of ASTM E 119.
 - B. Storage shall be as required by the manufacturer above ground, under cover and in a dry location until ready for use. All bags that have been exposed to water before use shall be found unsuitable for use and disposed of off the project site. Stock of material shall be rotated and used prior to its expiration date.

1.7 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM E 84 Surface Burning Characteristics
 - 2. ASTM E 119 Standard Methods of Fire Tests of Building Construction and Materials
 - 3. ASTM E 605 Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material Applied to Structural Members
 - 4. ASTM E 736 Cohesion/Adhesion of Sprayed Fire-Resistive Material Applied to Structural Members
 - 5. ASTM E 759 Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
 - 6. ASTM E 760 Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
 - 7. ASTM E 761 Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
 - 8. ASTM E 859 Air Erosion of Sprayed Fire-Resistive Material Applied to Structural Members
 - 9. ASTM E 937 Corrosion of Steel by Sprayed Fire-Resistive Material Applied to Structural Members
 - 10. ASTM E 1354 Cone Calorimeter
 - 11. ASTM G 21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- B. Bureau of Building Inspection: City of San Francisco
 - 1. Abrasion Resistance Test Method
 - Impact Penetration Test Method
- C. Underwriters Laboratories Inc. (UL) Fire Resistance Directory (Latest Edition)
- D. International Building Code (IBC) Section 720
- E. Associated Wall and Ceiling Institute (AWCI)
 - 1. AWCI Technical Manual 12-A: Standard Practice for the Testing and Inspection of Spray Applied Fire-Resistive Materials
 - 2. AWCI Technical Manual 12: Design Selection Utilizing Spray Applied Fire-Resistive Materials

1.8 ENVIRONMENTAL/PROJECT SITE CONDITIONS

- A. Care shall be exercised in the application of the fireproofing material so as not to endanger the environment.
- B. Maintain a minimum temperature of 40 degrees F (4.4 degrees C) for air and substrate for 24 hours before, during and after application of system. Coordinate with Section 01 50 00.
- C. Material shall be allowed to dry during and subsequent to its application. Material shall be substantially dry within 30 days after application.
- D. Ventilate building spaces during and after application of fireproofing, providing a minimum 4 complete air exchanges per hour and according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

1.9 MOCKUP

A. Before proceeding with the work, the applicator shall apply the fire protection material to a section of approximately 100 square feet (9.3 square meters) area. This section shall be witnessed by the architect's or owner's representative and

shall be subject to their approval to be used as a guide for texture and thickness of the finished work.

1.10 TESTING AND INSPECTION/FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections: Test and inspect as required by the IBC, 1704.10..
- B. The Architect shall select, and the Owner will pay an independent testing laboratory to sample and verify the thickness and density of the fireproofing in accordance with the provisions of ASTM E 605.
- C. The spray-applied fire resistive material shall be tested for thickness and density in accordance with one of the following procedures:
 - 1. ASTM E 605 Standard Test Method for Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members.
 - 2. AWCI Inspection Procedure for Field-Applied Sprayed Fire-Resistive Materials, Technical Manual 12-A; an annotated guide.
 - 3. ICBO, Section 720 Thickness and Density Determination for Spray-Applied Fire Protection.
- D. Test and inspect completed work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
- E. Fireproofing will be considered defective if it does not pass tests and inspections.
- F. Remove and replace fireproofing that does not pass tests and inspections, and retest.
- G. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- H. Prepare test and inspection reports.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All materials for spray-on fireproofing shall meet requirements of FS #SS-S-111B:
 - 1. Type I, factory mixed cementitious materials having a minimum average and minimum individual dry density of 15/14 pcf. Material shall be similar and equal to "Cafco Blaze Shield II" by Isolatek International, "5GP" by Southwest/Carboline, or equal.
 - 2. Type II, factory mixed asbestos free mineral fibers with integral inorganic binders having a minimum applied dry density of 15 pcf and shall be "Cafco 300" by Isolatek International or "Pyrolite 15" by Carboline
- B. MATERIAL CRITERIA Materials proposed for work of this Project shall meet the following minimum performance criteria -
 - 1. Material shall conform to the requirements for corrosion prevention to eliminate the necessity for steel painting in field in conformance with ASTM E 937; certification of this is required from this Contractor.
 - 2. Material shall not crack or delaminate under ASTM E 759 (Deflection) or ASTM E 760 (Bond Impact) testing.
 - 3. Bond strength on uncoated or galvanized material, minimum average 200

- psf, and minimum individual 150 psf as per ASTM E 736.
- 4. Maximum allowable total weight loss of the fireproofing material shall be 0.005 g/ft² when tested in accordance with ASTM E 859. Sample surface shall be "as applied" (not pre-purged) and the total reported weight loss shall be the total weight loss over a 24 hour period from the beginning of the test.
- 5. Deformation of not more than 10% when subjected to compressive forces of 1,200 psf as per ASTM E 761.
- 6. High Speed Air Erosion: Materials to be used in plenums or ducts shall exhibit no continued erosion after 4 hours at an air speed of 2500 ft/min (29 mph)] when tested per ASTM E 859.
- 7. Corrosion Resistance: Fireproofing applied to steel shall be tested in accordance with ASTM E 937 and shall not promote corrosion of steel.
- 8. Abrasion Resistance: No more that 15 cm3 shall be abraded or removed from the fireproofing substrate when tested in accordance with the test methods developed by the City of San Francisco, Bureau of Building Inspection.
- Impact Penetration: The fireproofing material shall not show a loss of more than 6 cm3 when subjected to impact penetration tests in accordance with the test methods developed by the City of San Francisco, Bureau of Building Inspection.
- 10. Surface Burning Characteristics ASTM E 84, 0/0.
- 11. Resistance to Mold: The fireproofing material shall be formulated at the time of manufacturing with a mold inhibitor. Fireproofing material shall be tested in accordance with ASTM G 21 and shall show resistance to mold growth for a period of 28 days for general use.
- 12. Combustibility: Material shall have a maximum total heat release of 20 MJ/m2 and a maximum 125 kw/m2 peak rate of heat release 600 seconds after insertion when tested in accordance with ASTM E 1354 at a radiant heat flux of 75 kw/m2 with the use of electric spark ignition. The sample shall be tested in the horizontal orientation.

<u>NOTE</u>: If adhesive or primer is required for any proposed system, same shall be furnished and installed in accordance with the manufacturer's directions at no additional cost to the Owner.

C. PATCHING EXISTING FIREPROOFING

- 1. Patch Kit: Patch existing fireproofing disturbed by construction activities and areas with missing fireproofing in the area of work. Areas more than 1 square foot in area will require spray application with patch pump.
 - a) Installer shall examine materials on site to identify original product;
 - b) Verify compatibility with existing fireproofing
 - c) Materials shall comply with recommendations in "UL Requirements for Patching SFRM."

D. AUXILLIARY FIRE-RESISTIVE MATERIALS

1. General: Provide auxiliary fire-resistive materials that are acompatible with sprayed fire-resistive materials and substrates and area spproved by UL or another testing and inspecting agency acceptable to authority having jurisdiction for use in fire-resistive designs indicated.

- 2. Substrate Primers: For use on each substrate and with each sprayed fireresistive product, provide primer that complies with one of more of the following requirements:
 - a) Primers bond strength complies with requirements specified in UL's "Fire Resistance Directory" for coating materials based on a series of bond tests per ASTM E 736.
 - b) Primer is identical to those used in assemblies testing for fire-testresponse characteristics of sprayed fire-resistive materials per ASTM E119 by UL.
- 3. Adhesive for Bonding Fire-Resistive Material: Product approved by manufacturer of sprayed fire resistive materials.
- 4. Metal lath: Expanded metal lath fabricated from material of weight, configuration, and finish required to comply with fire-resistance designs indicated and fire-resistive material manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive sprayed fire-resistive materials.
- 5. Topcoats: provide fireproofing manufacturer recommended topcoats for exposed fireproofing.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

- A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.
- B. Conduct tests according to fire-resistive material manufacturer's written recommendations to verify that substrates are free of substances capable of interfering with bond.
- C. Application shall be started only after the Contractor is satisfied that surface and temperature conditions are acceptable.

3.2 INSTALLATION

A. All fireproofing application shall be with manufacturer approved equipment and either by a licensed applicator under the direction of the manufacturer or by the manufacturer of the material directly.

All systems shall be applied to the required thicknesses for ratings required notwithstanding dimensions, if any, shown on the drawings. A schedule of required thicknesses for intended material shall be submitted as per Paragraph 1.05 above.

- B. Install metal lath and reinforcing fabric as required to comply with fire-resistance ratings and fire-resistive material manufacturer's written recommendations for condition of exposure and intended use. Use anchorage devices of type recommended in writing by manufacturer.
- Coat existing substrates with bonding adhesive before applying fire-resistive material where required to achieve fire-resistive rating or as recommended in writing by sprayed fire-resistive material manufacturer for material and application

indicated.

- D. Extend fire-resistive material in full thickness over entire area of each substrate to be protected. Unless otherwise recommended in writing by manufacturer, install body of fire-resistive covering in a single course.
- E. Where sealers are used, apply products that are tinted to differentiate them from sprayed fire-resistive material over which they are applied.
- F. Apply and cure sprayed fire-resistive materials according to product manufacturer's written recommendations.

3.3 CLEANING, PROTECTION AND ADJUSTMENT

- A. The work area shall be maintained in an orderly condition.
- B. After the completion of work, equipment shall be removed and all surfaces not to be sprayed shall be cleaned.
- C. Protect all new and existing construction, adjacent work and finished work from and damage.
- D. Upon completion of installation, all excess material, overspray, dropping and debris shall be cleared and removed from the job site.
- E. Coordinate application of sprayed fire-resistive materials with other construction to minimize need to cut or remove fire protection. As installation of other construction proceeds, inspect sprayed fire-resistive material and patch any damaged or removed areas.
- F. All patching of and repair to fire protection material, due to damage by other trades, shall be performed under this section and paid for by the trade responsible for the damage. The coordination of this requirement is the responsibility of the General Contractor; no additional cost shall be incurred by the Owner.
- G. Repair or replace work that has not successfully protected steel.
- H. Damage caused by the handling, storing or application of materials or the failure to provide adequate protection shall be repaired or replaced at no additional cost to the Owner.

3.4 WASTE MANAGEMENT – Coordinate with Section 01 74 19

- A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
- B. Set aside and protect materials suitable for reuse and/or remanufacturing.
- C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

End of Section

SECTION 078400 - FIRESTOPPING

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all <u>firestopping and smoke seal work</u> for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:

<u>NOTE</u>: Firestopping is defined as a material, or combination of materials, to restore the integrity of fire rated walls and floors by maintaining an effective barrier against the spread of flame, smoke and toxic gases and further defined in 1.04 below.

- 1. Provide firestopping and smoke seals as indicated on the drawings <u>and/or</u> required to maintain full and continuous smoke and fire barrier between zones including:
 - a. Through penetration firestops and smoke-stops for all fire-rated bearing and non-bearing wall and floor assemblies, both blank (empty) and those accommodating penetrating items such as cables, conduits, pipes, ducts, etc.
 - b. Membrane penetration protection for fire-rated walls.
 - Architectural/Construction joint firestops within walls, floors, or the intersection of floors to exterior walls, or the intersection of top of walls to ceilings.
 - d. Top of wall firestopping in all fire-rated partitions
 - e. Top of wall and construction joint smoke-stopping in all smoke partitions.
 - f. Work further includes any and all draftstop/acoustic stop annular packing for all partitions both rated and non-rated.

Cope and seal around <u>all</u> structural elements to insure smoke and fire barriers.

IT IS A MANDATE OF THIS CONTRACT THAT ALL FIRESTOPPING WORK BE ACCOMPLISHED BY A FM4991 ACCREDITED CONTRACTOR WITH AT LEAST ONE "Designated Responsible Individual (DRI)" IN THE EMPLOY OF THE SPECIALTY CONTRACTOR FIRM. A COPY OF THE QUALITY ASSURANCE MANUAL SHALL BE MAINTAINED ON THE JOB SITE FOR REVIEW BY THE DESIGN PROFESSIONAL, CONTRACTOR AND ANY OTHER INTERESTED PARTY.

2. Provide "mice blocking" at all new vertical and horizontal penetrations, and at all existing penetrations which are exposed during the course of demolition and new construction.

NOTE: A preinstallation conference shall be scheduled by the General Contractor with this Specialty Contractor and all other Prime/Specialty Contractors, Subcontractors and the like to establish procedures to maintain optimum working conditions and to coordinate the work of this Section with related and adjacent work.

1.3 RELATED WORK SPECIFIED ELSEWHERE - Entire Project Specification with specific reference to those sections noted above and as follows:

<u>NOTE</u>: Proper execution of this work will maintain the hourly ratings of the walls and floors and ensure progress of work in other Sections as listed below:

- A. Section 079000 Joint Sealants
- B. Section 092900 Gypsum Drywall
- C. Division 22 Plumbing
- D. Division 23 HVAC
- E. Division 26 Electrical Work
- F. Division 28 Electronic Safety and Security

1.4 QUALITY ASSURANCE

- A. Firestopping systems (materials and design):
 - 1. Shall conform to both Flame (F) and Temperature (T) ratings as required by local building codes and as tested by nationally accepted test agencies per ASTM E 814 or UL 1479 fire tests in a configuration that is representative of field conditions.
 - 2. The F rating must be a minimum of 1 hour but not less than the fire resistance rating of the assembly being penetrated.
 - 3. T rating when required by code authority shall be based on measurement of the temperature rise on penetrating item(s).
 - 4. The fire test shall be conducted with a minimum positive pressure differential of 0.03 inches of water column.
 - 5. For joints, must be tested to UL 2079 or E 1399 and E 1966 with movement capabilities equal to those of the anticipated conditions.
 - 6. Where there is no specific third party tested and classified firestop system available for a particular firestop configuration, the firestopping contractor shall obtain from the firestop manufacturer an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFFRA) for submittal.
- B. Firestopping materials and systems must be capable of closing or filling throughopenings created by 1) the burning or melting of combustible pipes, cable jacketing, or pipe insulation materials, or 2) deflection of sheet metal due to thermal expansion (electrical and mechanical duct work).
- C. Firestopping sealants must be flexible, allowing for normal pipe movement.
- D. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.
- E. Firestopping materials shall be moisture resistant, and may not dissolve in water after curing.
- F. For firestopping exposed to view, traffic, moisture, and physical damage, provide appropriate firestop systems for these conditions.

- G. All firestopping materials shall be manufactured by one manufacturer (to the maximum extent possible).
- H. Material used shall be in accordance with the manufacturer's written installation instructions.
- I. Firestopping shall be performed by a Specialty Contractor trained or approved, in writing, by firestop material manufacturer. Said specialist shall be as defined in the Conditions. Equipment used shall be in accordance with firestop material manufacturer's written installation instructions.
- J. Materials shall conform to all applicable governing codes.
- K. <u>All materials used in the work shall be certified "asbestos free"</u> and shall be free from any and all solvents or components that require hazardous waste disposal <u>or</u>, that after curing, dissolve in water.
- L. All materials shall comply with the interior finish flame spread and smoke developed requirements for the area in which they are installed. Coordinate with governing codes.

M. DEFINITIONS

- 1. FIRESTOPPING: The use of a material or combination of materials in a fire-rated structure (wall or floor) where it has been breached, so as to restore the integrity of the fire rating on that wall or floor.
- 2. SYSTEM: The use of a specific firestop material or combination of materials in conjunction with a specific wall or floor construction type and a specific penetrant(s), constitutes a "System"
- 3. BARRIER: Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.
- 4. THROUGH-PENETRATION: Any penetration of a fire-rated wall or floor that completely breaches the barrier.
- 5. MEMBRANE-PENETRATION: Any penetration in a fire-rated wall that breaches only one side of the barrier.
- 6. CONSTRUCTION GAPS: Any gap, joint, or opening, whether static or dynamic, where the top of a wall may meet a floor; wall to wall applications; edge to edge floor configurations; floor to exterior wall; or any linear breach in a rated barrier. Where movement is required, the firestopping system must comply with UL2079 for dynamic joints.

1.5 SUBMITTALS – Coordinate with Section 01 33 00

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the

Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.

NOTE: A "Certificate of Conformance", from the manufacturer listed in Part 2, is required with the "Submittal Package" to ensure that the material selected meets all of the criteria of this specification as set forth in Paragraph 1.04 of this Section.

- A. Submit manufacturer's product literature for each type of firestop material to be installed. Literature shall indicate product characteristics, typical uses, performance and limitation criteria, and test data. Submittal should be in compliance with Section 01 33 00.
- B. UL Tested Systems: Submit drawings showing typical installation details for the methods of installation. Indicate which firestop materials will be used and thickness for different hourly ratings.
- C. Engineering Judgments: Submit manufacturer's drawings for all non-standard applications where no UL tested system exists. All drawings must indicate the "Tested" UL system upon which the judgment is based so as to assess the relevance of the judgment to some known performance.
- D. Submit manufacturer's installation procedures for each type of product.
- E. Approved Applicator: Submit document from manufacturer wherein manufacturer recognizes the installer as qualified or submit a list of past projects to demonstrate capability to perform intended work.
- F. Upon completion, installer shall provide written certification that materials were installed in accordance with the manufacturer's installation instructions and details.
- G. Mockups (Coordinate with Section 01 43 39):
 - 1. Prepare job mockup of the material proposed for use in the project as directed by Architect.

Approved mockups <u>shall</u> be left in place as part of the finished project and will constitute the standard for remaining work, including <u>aesthetics</u>.

- H. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.
- 1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)
 - A. Deliver all materials to be used in the work of this section to the project site in original sealed containers with manufacturer's brand and name, lot numbers, UL labeling, mixing and installation instructions clearly identified thereon.
 - B. Store all materials in accordance with manufacturers directions.

All materials shall be dated with shelf life and shall be removed from the project site at the contractors expense if date is expired.

1.7 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. E 814 Standard Method of Fire Tests of Through Penetration Fire Stops.
 - 2. E 119 Methods of Fire Tests of Building Construction and Materials.
 - 3. E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.

- 4. E 136 Test Method for Behavior of Materials in a Vertical Tube Furnace at 750F
- 5. E 1399 Cyclic Movement and Measuring Minimum and Maximum Joint Widths
- 6. E 1966 Test Method for Resistance of Building Joint
- 7. E 2174 Standard Practice for On-Site Inspection of Installed Fire Stops
- 8. E 05.11.14 Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus (ISMA); ASTM permanent number assignment pending approval of Draft
- B. Underwriters Laboratories, Inc. (UL)
 - 1. UL 1479 Fire Tests of Through Penetration Fire Stops.
 - 2. UL 263 Fire Tests of Building Construction and Materials.
 - 3. UL 723 Surface Burning Characteristics of Building Materials.
 - 4. UL 2079 Tests for Fire Resistance of Building Joint Systems
 - 5. UL "Fire Resistance Directory", current year, including but not limited to the following:
 - a. For penetrations by uninsulated, non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT) UL System: CAJ1235, CAJ1404, WL1152.
 - b. For penetrations by insulated, non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT) UL System: CAJ5222, CAJ5250, CAJ5251, WL5171.
 - c. For penetrations by PVC jacketed, flexible cable or cable bundles and plastic pipe (closed piping systems) - UL System: CAJ2401, CAJ3185, CAJ3199, CAJ3234, WL3118, WL3179, WL3199.
 - d. For penetrations by combustible plastic pipe (open piping systems)
 UL System: CAJ2174, CAJ2339, CAJ2351, CAJ2432, WL2168, WL2170, WL2185, WL2259.
 - e. For penetrations by multiple combustible and/or non-combustible items UL System: CAJ8101, CAJ8133, WL8007.
 - f. For large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways UL System: CAJ1406, CAJ1502, CAJ4053, CAJ6027, WJ6004, WL1207, WL1343 WL4030, WL6018.
 - g. For penetrations by steel ducts UL System: CAJ7075, CAJ7082, WJ7045, WJ7046, WL7006, WL7046, WL7081, WL7082.
 - h. For fire-rated construction joints and other gaps OPL System: CEJ296P, CEJ302P.
 - 6. For openings between structurally separate sections of wall and floors. At the top of walls UL System: HWD0107, HWD0110, HWD0257, HWD0267, HWD0299, HWD0327, HWD0266, HWD0333, HWD0334.
- C. Factory Mutual (FM) Approval Guide, current year.
 - 1. FM Approval Standard of Firestop Contractors Class 4991
- D. Building code of the jurisdiction of the Work.
- E. National Fire Protection Association
 - 1. NFPA 101 Life Safety Code.
 - 2. NFPA 70 National Electrical Code.
 - 3. NFPA 221 Fire Walls and Fire Barriers (preliminary to be released)
 - 4. NFPA 251 Fire Tests of Building Construction and Materials

- F. FICA "Manual of Practice"
- G. Certification of "DRI" employee(s)
- H. International Firestop Council (IFC):
 - 1. Ref. 1 Recommended IFC Guidelines for Evaluating Firestop Engineering Judgments (April 2001)
 - 2. Ref. 2 Inspectors Field Pocket Guide

1.8 PROJECT CONDITIONS

- A. Conform to manufacturer's printed instructions for installation and when applicable, curing in accordance with temperature and humidity. Conform to ventilation and safety requirements.
- B. Coordinate work required with work of other trades; <u>firestopping shall</u>, <u>where practical</u>, <u>precede gypsum board or other applied sheet finishing</u> operations.
- C. Where firestopping is installed at locations which will remain exposed in the finished work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as required against damage from other construction operations.

1.9 SEQUENCING

- A. Schedule firestopping after installation of penetrants but prior to concealing the openings.
- B. Firestopping shall precede gypsum board finishing.

1.10 PROTECTION

A. A Where firestopping is installed at locations which will remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

1.11 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

2.1 GENERAL

- A. Firestopping materials and systems shall meet the requirements specified herein.
- B. Architect must approve in writing any alternates to the materials and systems specified herein.
- C. All firestop products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the thermal and fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.
- D. For applications where combustible penetrants are involved, i.e., insulated and plastic pipe, a suitable intumescent material must be used.
- 2.2 SPECIFICATION STANDARD: For purposes of establishing standards of quality <u>and</u> levels of performance and not for the purposes of limiting competition, the basis of this specification is upon units as manufactured by one of the following and their respective model suitable for the intended application.
 - A. Hilti, Inc.
 - B. Specified Technologies, Inc.
 - C. Grace Construction Products (Flame Safe).
 - D. Nelson Firestop Products, Div. of EGS Electrical Group
 - E. Tremco, Inc.
 - F. U.S. Gypsum Company
 - G. Johns Manville
 - H. 3M Fire Protection Products

2.2 PRODUCTS SHALL GENERALLY INCLUDE

- A. Cast-In-sleeves (Similar to 3M "CID")
- B. Mortar seals
- C. Fire stop design sealant compounds, caulk and foam systems.
- D. Putty and putty pads
- E. Firestop kits including collars, plugs, etc.
- F. Seal bags
- G. Tapes and blankets
- H. Intumescent design wrap strips
- I. Mineral type unfaced safing insulation with third party wrap, 3.5 pcf density, UL R-10905 label.

2.3 ACCESSORY ELEMENTS

- A. Forming, damming materials shall be mineral fiber board or other suitable material recommended by nominated system manufacturer.
- B. Primers, sealant and solvent cleaners shall be as recommended by the nominated system manufacturer.
- C. Metal Systems 20 gauge phosphatized, electrogalvanized steel plate and/or galvanized steel clips.

2.4 MICE BLOCKING

- A. "Stuff Fit" copper mesh crack and crevice seal by Allen Special Products, P.O. Box 605, Montgomeryville, PA 18936.
- 2.5 Balance of materials shall be as specified elsewhere in this Section.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

- A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.
- B. Verify that environmental conditions are safe and suitable for installation of firestop products.
- C. Verify that all pipe, conduit, cable, and other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.2 PREPARATION

A. The surface shall be dry, clean, and free of all foreign matter.

Do not apply firestopping to surfaces previously painted or treated with a sealer, curing compound, water repellant or other coatings unless tests have been performed to ensure compatibility of materials.

- B. Provide primers as required which conform to manufacturer's recommendations for various substrates and conditions.
- C. Mask where necessary to protect adjoining surfaces.
- D. Remove excess material and stains on surfaces as required.

3.3. INSTALLATION - GENERAL SYSTEMS

- A. Install in strict accordance with manufacturer's printed instructions as well as U.L guidelines and state and local fire codes..
- B. Ensure that anchoring devices, backup materials, clips, sleeves, supports and other materials used in the actual fire test are installed.
- C. Install firestopping with sufficient pressure to properly fill and seal openings to ensure an effective smoke seal.
- D. Tool or trowel exposed surfaces. Remove excess firestop material promptly as work progresses and upon completion.
- E. Install dams when required to properly contain firestopping materials within openings and as required to achieve required fire resistance ratings. Combustible damming materials <u>must</u> be removed after appropriate curing. Incombustible damming materials may be left as a permanent component of the firestopping system.

3.4 FIRESTOPPING CONSTRUCTION AT BUILDING EXTERIOR PERIMETERS, INTERIOR WALLS, SHAFTS, ETC.

- A. Install material of proper size on continuous plates or clips as required for proper support in order to safe-off area between exterior walls, interior walls and shafts and floor slabs and said walls and roof areas leaving NO VOIDS.
- B. Firestopping is required at all juncture conditions whether or not clips, angles or other structural elements exist either intermittently or continuously.
- C. Attach plates and/or clips to floor levels and other breaks and extend through framing to sheathing and/or other solid strata.
- D. Where metal decking flutes, either parallel or perpendicular to walls, occur and are

- open, same shall be fully packed and sealed with proper firestopping system.
- E. Where firestopping is accomplished <u>after</u> installation of drywall or other applied sheet finish, all spaces between penetrations and finish shall be filled to the thickness of said sheet finish with intumescent caulk.
- F. At all linear openings, fill voids with a minimum of 6 inches of minimum 3.5 lb./cu.ft. density safing insulation as specified in Part 2 herein <u>and</u> cover entire surface with UL listed firestop sealant of one of nominated manufacturers identified in Part 2 herein.

3.5 PENETRATION SEALS

- A. Penetrations are defined as conduits, cables, wires, piping, ducts or other elements passing through one or both outer surfaces of fire rated walls, floors or partitions and shall be firestopped on both sides of penetration in accordance with requirements set forth in Paragraph 1.04 of this Section.
- B. Where sleeves are used, same shall be as specified in Part 2 herein; in event that sleeves are not used, core openings and caulk or wrap penetrating items with intumescent system the full length of penetration and seal on both sides with intumescent caulk.
- C. Residual openings within square or rectangular holes shall be filled with compounds applicable for substrate encountered and all penetrations sealed on both sides with caulk.

3.6 MICE BLOCKING

A. At fire rated penetrations and at penetrations in finish areas, install copper mesh prior to filling or sealing the penetration.

3.7 FIELD QUALITY CONTROL

- A. Contractor shall immediately notify the Architect if the firestopping systems herein specified cannot meet the requirements of the specification.
- B. Contractor shall examine firestops to ensure proper installation and full compliance with this specification.
- C. All areas of work must be accessible until inspection by the applicable Code authorities.
- D. Correct unacceptable firestops and provide additional inspection to verify compliance with this specification at no additional cost.

3.8 IDENTIFICATION

- A. Identify firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
 - 1. The words: "Warning--Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Firestop system designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Firestop system manufacturer's name.
 - 6. Installer's name.

3.9 CLEANING

- A. When finished work will be visible, clean adjacent surfaces in accordance with manufacturer's printed instructions.
- B. If visible in the finished work, remove temporary dams after initial cure of firestops.
- C. Correct staining and discoloring on adjacent surfaces.
- D. Remove all debris and excess materials entirely from site and leave work in a neat and clean condition.

3.10 FIRESTOP SYSTEM SCHEDULE

- A. The following schedules shall be completed by the Contractor and reviewed prior to submission to the Architect. The untitled table included shall be completed with each of the following categories of penetrating items.
 - 1. Single uninsulated metallic piping and conduit.
 - 2. Multiple uninsulated metallic piping and conduit.
 - 3. Uninsulated plastic piping and conduit.
 - 4. Insulated metallic piping.
 - 5. Insulated high temperature flues and exhaust pipes (boiler flues, generator exhausts insulated with calcium silicate or other non-combustible insulation).
 - 6. Cable tray.
 - 7. Electrical/telephone cable.
 - 8. Bus duct.
 - 9. Miscellaneous penetrations.
- B. Complete the additional tables for the following using the format provided.
 - 1. Blanks, voids, holes.
 - 2. Engineering judgments.
 - 3. Fire rated/resistant joints.
 - 4. Ductwork engineering judgments.

3.11 WASTE MANAGEMENT – Coordinate with Section 01 74 19

- A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
- B. Set aside and protect materials suitable for reuse and/or remanufacturing.
- C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

PENETRATING ITEM:

Manufacturer/Product Name:

Color:

Accessories:

Floor/wall Construction	Item Size/Description	Sleeve	F Rating	T Rating	Annular Space	Firestop Thickness	Tested Ass'y No.
							INO.

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BLANKS, VOIDS, HOLES

Manufacturer/Product Name	:
Color:	

Accessories:

Floor/wall Construction	Size/Description	F Rating	T Rating	Firestop Thickness	Tested Ass'y No.

ENGINEERING JUDGMENTS (Submit Actual Installation Drawing and Letter of Certification)

Color:

Accessories:

Floor/wall	Item Size/Description	F	T	Annular	Firestop	Packing
Construction		Rating	Rating	Space	Thickness	Thicknes
						S

FIRE RATED/RESISTANT JOINTS

Manufacturer/Product Name:

Accessories:				
Joint Description	F Rating	T Rating	Firestop Thickness	Tested Ass'y No.

DUCTWORK ENGINEERING JUDGMENTS

(Submit Actual Installation Drawing and Letter of Certification)

Manufacturer/Product Name:

Color:

Color:

Accessories:

Wall/FI Const.	Size	Fire Damper	F	T	Annular Space Range	Firestop Thickness	Packing Thicknes s

^{**}End of Section**

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Firestopping

SECTION 079000 - CAULKING AND SEALING/JOINT SEALANTS

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all caulking and sealing work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:

<u>NOTE</u>: It will be the responsibility of the nominated supplier/suppliers of any sealant system proposed for use in the work to perform a "bond" test on all substrates to determine adhesion properties and requirement, if any, for primer application; coordinate with Article 1.05 herein.

- 1. Provide sealant systems in all joints between dissimilar materials on building exterior as indicated and/or required to obtain water and air tight seals.
- 2. Provide expansion and/or control joint sealant systems within brick/stone masonry (coordinate with Section 042000 work to be accomplished as part of these operations) Type I OR II material with Type III backer system OR, at option of Contractor, ColorSeal system.
- 3. Provide horizontal sealing systems in connection with composite flooring systems to vertical surfaces
- 4. Provide sealants for cast stone joints over mortar or filler system provided under Section 04 72 00.
- 5. Provide all interior joints between dissimilar materials as indicated or required to insure positive seals -

Door frames - VI Window surrounds - VI Plumbing fixtures - II

Sound integrity - VI, Exposed; V, Concealed

Water penetration - II
Light seals - VI

Mill & counter work - VI, Dry; II for Wet

NOTE: Sealants are generally required at the following locations -

- a. Interior door frames to surrounding face construction;
- b. Interior window trim/reveals to window frames;
- c. Plumbing fixtures and accessories where same abut finished surfaces:
- d. Scribed counter and casework systems where same abut finished surfaces:
- e. Where gypsum wall board is in contact with concrete slabs, walls and columns (tops, bottoms and sides)
- f. Where concrete block is in contact with concrete slabs, walls and

columns (tops, bottoms and sides)

g. At fire rated gypsum partition systems (coordinate with Section 092900)

and like locations where dissimilar materials abut each other in finished areas.

- 6. Bed door saddles Type VI
- 7. Provide acoustical sealing systems in connection with partitions and the like using Type V material where concealed and Type VI for exposed and painted areas.
- 8. Coordinate with Section 323000 for filling of top 1/2 inch of "sleeves" and/or "cores" retaining railing systems with Type IA material.
- 9. Perform balance of caulking and sealing as may be necessary and/or required to insure conformance to guarantee/warranty provisions contained herein.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. 033000 Cast in Place Concrete
 - B. 042000 Unit Masonry
 - C. 044000 Stone Work
 - D. 055000 Metal Fabrications Miscellaneous/Ornamental Metals
 - E. 062000 Finish Carpentry
 - F. 078400 Firestopping
 - G. 084000 Aluminum Construction
 - H. 085110 Aluminum Windows
 - I. 088000 Glass and Glazing
 - J. 089000 Louvers and Vents
 - K. 092900 Gypsum Drywall
 - L. 099000 Painting
 - M. 220000 Plumbing

1.4 QUALITY ASSURANCE

- A. The work of this Section shall be performed by a "Specialty Subcontractor" as defined in the Conditions.
- B. Bond testing shall be performed as noted in Paragraph 1.02.A above and results submitted to Architect for file.
- C. All surfaces to receive sealant shall be dry and cleaned of all foreign matter as specified in Part 3.
- D. Application devices shall have nozzles of proper size and shall provide sufficient pressure to completely fill joints as detailed.
- E. Consult sealant manufacturer for recommendations for application of sealant when air temperature is below 40°F. Provide written recommendation to Architect prior to application.
- F. Sealants shall comply with VOC requirements of the Jurisdiction of the Work, or in absence of said regulation, all material shall comply with the following as applicable for particular application and shall **not** contain or be formulated with aromatic solvents, halogenated solvents, fibrous talc or asbestos, formaldehyde, mercury, lead, cadmium, hexavalent chromium or their derivatives.
- G. Reference Standards

- 1. ASTM C 719 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
- 2. ASTM C 794 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
- 3. ASTM C 834 Latex Sealing Compounds
- 4. ASTM C 919 Standard Practice for Use of Sealants in Acoustical Applications.
- 5. ASTM C 920 Elastomeric Joint Sealants.
- 6. ASTM C 1087 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.
- 7. ASTM C 1193 Standard Guide for Use of Joint Sealants.
- 8. ASTM C 1248 Standard Test Method for Staining of Porous Substrate by Joint Sealants.
- 9. ASTM C 1311 Solvent Release Sealants.
- 10. ASTM C 1330 Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
- 11. ASTM C 1401 Standard Guide for Structural Sealant Glazing
- 12. ASTM C 1481 Standard Guide for Use of Joint Sealants with Exterior Insulation and Finish Systems (EFIS)
- 13. ASTM D 1056 Flexible Cellular Materials, Sponge or Expanded Rubber.
- 14. SWRI (Sealant, Waterproofing and Restoration Institute) Sealant and Caulking Guide Specification.

1.5 SUBMITTALS – Coordinate with Section 01 33 00

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Shop Drawings: Submit details to show installation and interface between sealants and adjacent work.
- B. Product Data indicating for each type of sealant and component used in this work chemical characteristics; performance criteria; substrate preparation; limitations; color availability; and the like affecting the use of each product.
- C. Samples of all components to be used in the work of this section.
- D. Color charts for selection.

- E. Schedule of sealant locations.
- F. Test Reports:
 - 1. Submit results of laboratory pre-construction testing.
 - 2. Submit results of field pre-construction testing.
 - 3. Submit manufacturer's recommendations for joint preparation, priming, and joint accessory materials based on test results.
 - 4. Submit manufacturer's recommended installation procedure modifications resulting from field adhesion tests.
- G. Manufacturer's installation instructions indicating, if any, special procedures; surface preparation; perimeter conditions requiring special attention; and like items affecting installation of each product. **Results of bond tests shall be incorporated in installation recommendations.**
- H. Certification of specification compliance.
 - 1. Certify products are suitable for intended use and products meet or exceed specified requirements.
 - 2. Certify applicator is approved by manufacturer.
- I. Qualifications Data: Submit applicator's qualifications, including reference projects of similar scope and complexity, with current phone numbers and contact names of architects and owners for verification.
- J. Manufacturer's Field Reports:
 - 1. Indicate time present at project site.
 - 2. Include observations, indicate compliance with manufacturer's installation instructions, and supplemental instructions provided to installers.
- K. Material Safety Data Sheet (MSDS) must be submitted for each product.
- L. Operation and Maintenance Data:
 - 1. Submit recommended inspection intervals.
 - 2. Submit instructions for repairing and replacing failed sealant joints.
- 1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)
 - A. Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.
 - B. Store products in a location protected from freezing, damage, construction activity, precipitation, and direct sunlight in strict accordance with manufacturer's recommendations.
 - C. Condition products to approximately 60 to 70 degrees F (16 to 21 degrees C) for use in accordance with manufacturer's recommendations.
 - D. Handle all products with appropriate precautions and care as stated on Material Safety Data Sheet.

1.7 QUALITY CONTROL

- A. Preconstruction Sealant Tests for Adhesion and Compatibility: Submit sealant samples for each material to be sealed in the work including, but not limited to metal flashing, painted wood at windows, glazing gaskets, glazing materials, framing members, masonry and stone of each type used, and all other components and accessories, to sealant manufacturer to verify sealant compatibility and to determine, by testing in compliance with ASTM C 794, as well as the type of primer required for each condition to ensure sealant adhesion to substrates.
 - 1. Cost of Testing: The sealant manufacturers shall perform and/or the

Contractor shall, at his own expense employ an independent testing agent acceptable to the Architect to perform tests and certifications indicated. No costs shall be passed to the Owner.

- 2. Test Samples: Submit to the testing agency or sealant manufacturer at least 5 pieces of each type, finish, kind, condition, and form of material to which sealant is to be attached.
- 3. Scheduling: Scheduling sufficient time for testing, analysis, and reporting of results.
- 4. Test Reports and Recommendations: Obtain written reports and recommendations regarding proper sealant material, primer, and application for each condition. Use sealants and substrates only in combinations for which favorable adhesion and compatibility results have been obtained.
- B. Construction Sealant Adhesion Tests shall be performed as specified under "Field Quality Control" in Part 3 of this Section.

1.8 MOCKUP REQUIREMENTS (Coordinate with Section 014339)

- A. Construct, in consort with other elements of the work, a sample mockup (s) of joint sealant surrounds; expansion/control joint sealant system and such other work, both interior and exterior as required by the Architect.
- B. Mockups shall show sealant types, colors and tooled (finished) surfaces.
- C. Where practical, mockups shall remain as part of the finished work.

1.9 SPECIAL GUARANTEE/WARRANTY TERMS

A. This Contractor shall, and hereby does warrant; and the Contractor shall, and hereby does guarantee that caulking and sealing work will be free from defects of materials and workmanship for 2 years from the date of final acceptance of this work.

The following types of failure will be adjudged defective work: leakage, hardening, chalking, crumbling, melting, shrinking or running of caulking; or staining of adjacent work by caulking.

Repair and replace work which becomes defective during the guarantee term, without cost to the Owner.

1.10 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality: Temporary ventilation: Provide temporary ventilation during work of this Section. Coordinate interior application of joint sealants with interior finishes schedule.

1.11 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.

- 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
- 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
- 9. Do not contain methylene-chloride.
- 10. Do not contain chlorinated hydrocarbons.
- 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Joint primer, sealer and/or conditioner shall be as recommended by the sealant manufacturer for the surfaces to be adhered to.
- B. Preformed joint fillers shall be nonstaining compatible with sealant and primer, and of a resilient nature and shall be one of the following:
 - 1. Closed Cell Neoprene Joint Filler (for precast panel joints not compatible with Silicone Sealants) ASTM D 1056, Class SC (oil resistant and medium swell), 2 to 5 psi compression deflection.
 - 2. Expanded Polyethylene Joint Filler (for existing joints) Flexible, compressible, closed-cell polyethylene of not less than 10 psi compression deflection (25%).
 - 3. Closed Cell Polyurethane Joint Filler (for pavements, walks, and curbs) Resilient, compressible, semi-rigid; W.R. Meadow's Ceramar or A.C. Horn's Closed Cell Plastic Foam Filler, Code 5401.
- C. Backer Rod for General Vertical Use: ASTM C 1330, Types B or C, rod stock closed cell polyethylene foam, closed cell neoprene foam, or open cell urethane foam, as recommended by sealant manufacturer as being compatible both with the sealant used and the primer. Provide the following products and certification that it meets the requirements or Architect approved substitute:
 - 1. SOF ROD as manufactured by Nomaco Inc. or Eva-Seal #30 Foam Backer Rod as manufactured by E-poxy Engineered Materials shall be used for all building joints. SOF ROD shall have a nonabsorbing outer skin and a highly resistant interior network of closed and open cells, which will not outgas when ruptured. Eva Seal #30 shall be a closed cell, cross-linked ethylene vinyl acetate copolymer foam.
 - 2. GREEN ROD as manufactured by Nomaco, Inc. shall be used for paving and floor joints. Rod shall be a closed cell polyethylene rod extruded in continuous lengths.
 - 3. Denver Foam as manufactured by Backer Rod Manufacturing and Supply Co.(Open Cell)

D. Accessory Items:

- 1. Bond Breaker Tape Polyethylene or other plastic tape as recommended by the sealant manufacturer; non-bonding to sealant; self-adhesive where applicable; thickness, minimum 0.012 inch. Tapes manufactured by the following are acceptable:
 - a. #40 or #531 (heavy duty) Bond Breaker Tape as manufactured by Valley Industrial Products, Huntington, New York.
 - b. #50 Polyethylene Bond Breaker Tape as manufactured by Decker Mfg. Co., Fairfield, New Jersey.
 - c. CRL Bond Breaker Tape as manufactured by C.R. Laurence Company Inc.

- 2. Cleaning Solvents Oil free solvents as recommended by the sealant manufacturer. Do not use reclaimed solvents.
- 3. Masking Tape Removable paper or fiber tape, self-adhesive, non-staining.
- 4. Materials impregnated with oil, bitumen or similar materials shall not be used.

E. Sealant Colors

- 1. Exposed materials, provide color as indicated or, if not indicated, as selected by the Architect from manufacturer's standard colors.
- 2. Concealed materials, provide the natural color which has the best overall performance characteristics.

2.2 MATERIAL TABLE

<u>NOTE</u>: At the Contractors' option, a "Silyl-Terminated Polyether" compound as manufactured by BASF Building Products under the name "Sonolastic 150" or "ProSil^{sct}1" by Pecora acceptable for use in lieu of Type I and Type II materials as specified below.

- A. Sealant materials shall be as follows and shall relate to scope of work described herein and shall form a general material reference for all sections performing sealant operations. Backer systems shall be as specified in Paragraph 2.01 above and as suitable for intended substrate and joint conditions.
- B. <u>Type I</u> (For use in vertical expansion joints where extensive movement occurs and for general exterior sealant operations.)

Sealant compound - 2 component non-sag Polyurethane similar and equal to -

Tremco (Dymeric 240FC or Dymonic FC) BASF Building Products (Sonolastic NP2) Pecora (Dynatrol II) Mapei (Mapeflex P1)

C. <u>Type - IA</u> (For use with pavements, walks, curbs, plaza decks and other such locations)

Sealant compound - 2 component self leveling polyurethane material similar and equal to -.

BASF Building Products (Sonolastic SL2 Horizontal) Pecora (Urexpan NR-200 Horizontal/Dynatred Vertical) Tremco (THC 900/901) Mapei (Mapeflex P1 SL)

D. <u>Type - II</u> - GENERAL (For use in vertical expansion joints where extensive movement occurs and for general exterior sealant operations.)

Sealant compound - 1 part, low-modulus silicone sealant similar and equal to -

1. Dow Corning (795)

- 2. General Electric (Silpruf)
- 3. Pecora (864)
- 4. BASF Building Products (Omniseal)
- 5. Tremco (Spectrem 1 or 2 as suitable for intended application)

Backing - Type "A" backer rod as per Paragraph 2.01.C above for general use and Type III sealant for moving joints.

E. Type - IIA - GLAZING SYSTEMS

Sealant compound - Silicone rubber of design recommended by the manufacturer for the intended application and similar and equal to -

- 1. General Electric -SSG 4000 OR 4200 Structural Glazing Sealant; 3211 or 3103 Insulating Glass Sealant; 2000 Weather Seal.
- 2. Dow Corning 795, 895, 983 or 995 as suitable for encountered conditions.
- 3. Tremco Inc.– Tremco Proglaze SG or Spectrem 2 Structural Glazing Sealant; Tremco Proglaze II Insulation Glass Sealant.
- 4. Pecora #895

or other suitable combination as recommended by the nominated manufacturer of the overall window/curtain wall assembly.

F. <u>Type - IIB</u> - SANITARY SEALS (use at interior wet areas only - Counter tops to surrounds; Bath tub to tile walls and floors; Shower areas, joint to joint; Plumbing fixtures to walls; and like areas)

Material shall be a single component, mildew resistant silicone sealant similar and equal to -

- 1. Dow Corning 786
- 2. General Electric Sanitary 1700
- 3. Bostik Silicone Rubber Bathroom Caulk.
- 4. Pecora #898 or 863 at option of Contractor.
- 5. Tremco Tremsil 200
- G. <u>Type III</u> (For use as a primary sealant expansion joint systems and as backup to Type II material for aesthetic affect; horizontal deck sealants and other such applications as may be noted on the drawings.)

Sealant compound - Compressible, polyurethene sponge

MANUFACTURERS:

First List, Primary Sealant; Second List, Backer Seal

Emseal USA, Inc. (Emseal precompressed, sheathed) WillSeal USA (Willseal 600) Tremco (illmod 600)

OR

Emseal USA, Inc. (BackerSeal precompressed, sheathed)
WillSeal, USA (Willseal)
Tremco (illmod)
Polytite Manufacturing (Polytite B)

H. <u>Type - IV</u> (For use in connection with roofing, flashing and waterproofing work)

Sealant compound - Single component non-sag Polyurethane similar and equal to

- 1. Tremco(Vulkem-116)
- 2. BASF Building Products (Sonolastic NP1)
- 3. Sika Chemical Company (Sikaflex 1a)
- 4. Tremco (Dymonic)
- 5. Pecora (Dynatrol I)
- I. <u>Type V</u> (For use in acoustical sealing operations)

Sealant compound - Butyl Rubber or Latex Base for developing acoustical requirements specified. Material shall be similar and equal to -

- 1. Pecora (BA-98)
- 2. W.W. Henry (313)
- 3. U.S. Gypsum (Acoustical Sealant)
- 4. Tremco (Acoustical Sealant)
- 5. Mason Industries, Inc. (Acoustical Caulking CC-75)
- J. <u>Type VI</u> (For interior sealant systems around door frames, window reveals and like locations in painted surfaces)

Sealant compound – Siliconized Acrylic Latex or FDC Siliconized Acrylic each with a 50 year warrantee similar and equal to:

- 1. RCS20 by GE-Silicones.
- 2. DAP® ALEX PLUS® Acrylic Latex Caulk Plus Silicone
- 3. LIFETIME® Siliconized Acrylic by Red Devil
- 4. Pro Select® Siliconized Acrylic Latex Caulk by Sherwin Williams

Backing - as required by conditions of use.

- K. <u>Type VII</u> Fire Rated Caulking compound for bedding and/or sealing of joints in rated gypsum wall systems shall be similar and equal to: "AC20 FTR" by Pecora; "Tremstop Acrylic" by Tremco; "Blockade" by DAP; "FS 1900 Series Sealant Intumescent Elastomeric Firestop" by International Protective Coatings, Inc. or approved equal.
- 2.3 EXPANSION JOINT SYSTEM

- A. Manufacturer: EMSEAL JOINT SYSTEMS, LTD, 23 Bridle Lane, Suite 3, Westborough, MA 01581-2603; Toll Free: 800-526-8365 or PH: 508-836-0280, FX: 508-836-0281
- B. Seal shall be silicone pre-coated, preformed, precompressed, self-expanding, sealant system. Seal shall combine factory-applied, 15 Shore-A hardness, low-modulus silicone, and a backing of acrylic-impregnated expanding foam into a unified binary sealant system.
- C. Expanding foam to be open-cell polyurethane foam impregnated with a water-based, non-drying, polymer-modified acrylic. Product movement capability of +50% and -50% (total 100%) of mean temperature joint size. Silicone external color facing to be factory-applied to the foam while it is partially pre-compressed to a width greater than maximum joint extension and cured before final compression. When compressed to final supplied dimension, a bellows with distinct and uniform folds to handle movement must be created in the silicone coating. Silicone coating to be available in a range of not less than 11 colors for coordination with typical building materials.
- D. Sealant must be supplied precompressed to less than the joint size, packaged in shrink-wrapped lengths (sticks) with a self-adhesive on one face. End to end joins of consecutive lengths of material to be joined by mitering across the direction of expansion of the material (sizes above 2-3/4 inches can be butted, as opposed to mitered, together) and joined faces to be lightly "buttered" with silicone. To obtain identical color sealant, use sealant supplied by manufacturer. Depth of seal as recommended by manufacturer.
- E. Sealing against the substrate to be achieved through a combination of the pressure-sensitive adhesive impregnation, and the back pressure of the expanding foam, as well as through the addition, by the contractor in the field, of a corner bead of silicone supplied by the sealant manufacturer.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 JOINT DESIGN

- A. Joints shall be a maximum of 3/8 inch deep by minimum 3/8 inch wide.
- B. Joints in concrete or masonry:
 - 1. Depth of sealant shall equal width of joints in joints up to 1/2 inch wide; joints 1/2 inch to 1 inch wide, depth shall be 1/2 inch.
 - 2. For expansion joints or other joints 1 inch to 2 inch wide depth shall not be greater than 1/2 the applied sealant width and no greater than 5/8 inch for Type I nor 1/2 inch for Type II materials.
- C. Joints in metal, glass and other non-porous surfaces: Depth shall be a minimum of 1/2 the applied sealant width, and shall in no case exceed the applied sealant width.

3.3 PREPARATION

A. Prepare joints in accordance with ASTM C 1193 and manufacturer's instructions.

- B. Clean joint surfaces immediately before installation of sealant and other materials specified in this Section.
 - 1. Remove all loose materials, dirt, dust, rust, oils and other foreign matter that will impair the performance of materials installed under this Section.
 - 2. Remove lacquers, protective coatings and similar materials from joint faces with manufacturer's recommended solvents.
 - 3. Do not limit cleaning of joint surfaces to solvent wiping; use methods such as grinding, etching or other approved and manufacturer's recommended means, if required, to clean the joint surfaces, assuring that the sealant materials will obtain positive and permanent adhesion.
- C. For Pavements, Walks, and Curbs
 - Set joint fillers at proper depth and position as required for installation of bond breakers, backer rods, and sealants. Do not leave voids or gaps between the ends of joint filler units.
 - a. Smooth Edged Joints: For joints between two concrete slabs or where new concrete abuts smooth-edged materials, use either cork joint filler or closed cell polyurethane joint filler.
 - b. Irregular Edged Joints: For joints where new concrete abuts granite curbs or other irregular edges, use closed cell polyurethane joint filler.
 - c. Prime all joint surfaces; Do not allow the primer/sealer to spill or migrate onto adjoining surfaces.

3.4 JOINT BACKING INSTALLATION

- A. Install bond breaker tape in relaxed condition as it comes off the roll. <u>Do not stretch the tape</u>. Lap individual lengths.
- B. Prevent three sided adhesion by use of bond breaker tapes or backer rods at the back of the joint. Install backer rods for all liquid sealants, except where specifically recommended against by sealant manufacturers. Install backer rods immediately before sealants, do not permit backer rods to get wet. Install backer rods at the proper depth to create the specified sealant depth, avoid placing backer rods too deep which will result in sealant failure due to excessive sealant depth. Backup material shall be suitable size and shape so that when compressed 20 to 50%, it will fit in all joints where required. Do not cut or puncture the surface skin of the rod.
- C. Apply masking tape where required by surfaces encountered, and as may be determined by mockup testing, in continuous strips in alignment with joint edge. Remove tape immediately after joints have been sealed and tooled.

3.5 SEALANT INSTALLATION

- A. Prime surfaces where required with primer recommended by sealant manufacturer and as determined by "bond" test required in Part 1 of this Section.
- B. Apply, tool and finish sealant in accordance with manufacturer's recommendations.
- C. Install sealants with ratchet hand gun or other approved mechanical gun. Where gun application is impracticable, install sealant by knife or by pouring, as applicable. "Gun" devices shall have nozzles of proper size and shall provide sufficient pressure to completely fill joints as detailed.
- D. Finishing: Tool all vertical, non-sag sealants so as to compress the sealant, eliminating all air voids and providing a neat smoothly finished joint. Provide

slightly concave joint surface, unless otherwise indicated or recommended by the manufacturer. All tooling shall be "dry".

3.6 FIELD QUALITY CONTROL

- A. Require sealant manufacturer to be present at project site to:
 - 1. Observe sealant mockup installation and to issue reports of observations.
 - Conduct field pre-construction testing.

B. Test Samples

- If requested by the Architect, for each 1,000 linear feet of joint installed, cut
 out and carefully remove a 6 inch long sample of the undisturbed sealant
 and joint backer material from the newly installed Work. Remove the
 samples in the presence of the Testing Laboratory's Representative, who
 will retain them for evaluating and testing.
- 2. Reseal cutout areas with the same type materials.

3.7 CLEANING

- A. Immediately remove misapplied sealant and droppings from metal surfaces with solvents and wiping cloths. On other materials, remove misapplied sealant and droppings by methods and materials recommended in writing by the manufacturer of the sealant material.
- B. After sealants are applied and before skin begins to form on sealant, remove all masking and other protection. Clean up remaining defacement caused by the Work.
- C. All finished work shall be left in neat, clean condition.

3.8 WASTE MANAGEMENT – Coordinate with Section 017419

- A. Separate waste in accordance with the Waste Management Plan.
- B. Close and seal tightly all partly used sealant containers and store protected in well-ventilated, fire-safe area at moderate temperature.
- C. Place used sealant tubes and containers in areas designated for hazardous materials.

End of Section

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

Drawings and general provisions of the Contract, including General A. Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

SUMMARY 1.2

A. Section Includes:

- 1. Standard and custom hollow metal doors and frames.
- 2. Steel sidelight, borrowed lite and transom frames.
- Louvers installed in hollow metal doors. 3.
- Light frames and glazing installed in hollow metal doors.

B. **Related Sections:**

- 1. Division 01 Section "General Conditions".
- 2. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
- 3. Division 08 Section "Flush Wood Doors".
- Division 08 Section "Glazing" for glass view panels in hollow metal doors. 4.
- Division 08 Section "Door Hardware". 5.
- Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting 6. hollow metal doors and frames.
- 7. Division 26 "Electrical" Sections for electrical connections including conduit and wiring for door controls and operators installed on frames with factory installed electrical knock out boxes.
- C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and
 - ANSI/SDI A250.4 Test Procedure and Acceptance Criteria for Physical 2. Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
 - ANSI/SDI A250.6 Recommended Practice for Hardware Reinforcing on Standard 3. Steel Doors and Frames.
 - ANSI/SDI A250.10 Test Procedure and Acceptance Criteria for Prime Painted 4. Steel Surfaces for Steel Doors and Frames.
 - ANSI/SDI A250.11 Recommended Erection Instructions for Steel Frames. 5.
 - ASTM A1008 Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

- 7. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- 8. ASTM A924 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- 9. ASTM C 1363 Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
- 10. ANSI/BHMA A156.115 Hardware Preparation in Steel Doors and Frames.
- 11. ANSI/SDI 122 Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
- 12. ANSI/NFPA 80 Standard for Fire Doors and Fire Windows; National Fire Protection Association.
- 13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
- 14. NFPA 252 Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
- 15. UL 10C Positive Pressure Fire Tests of Door Assemblies.
- 16. UL 1784 Standard for Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
 - 1. Elevations of each door design.
 - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of anchorages, joints, field splices, and connections.
 - 6. Details of accessories.
 - 7. Details of moldings, removable stops, and glazing.
 - 8. Details of conduit and preparations for power, signal, and control systems.

D. Samples for Verification:

1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40" above sill) or UL 10C.
 - Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
 - 2. Temperature-Rise Limit: Where indicated 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.
 - 3. Smoke Control Door Assemblies: Comply with NFPA 105.
 - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.
- E. Energy Efficient Exterior Openings: Comply with minimum thermal ratings, based on ASTM C1363. Openings to be fabricated and tested as fully operable, thermal insulating door and frame assemblies.
 - 1. Thermal Performance (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM C1363 and meet or exceed the following requirements:
 - a. Door Assembly Operable U-Factor and R-Value Ratings: U-Factor 0.37, R-Value 2.7, including insulated door, thermal-break frame and threshold.
 - Air Infiltration (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM E283 to meet or exceed the following requirements:
 - Rate of leakage of the door assembly shall not exceed 0.25 cfm per square foot of static differential air pressure of 1.567 psf (equivalent to 25 mph wind velocity).
- F. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

- Deliver hollow metal work palletized, wrapped, or crated to provide protection during A. transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
 - Provide minimum 1/4-inch space between each stacked door to permit air 1. circulation. Door and frames to be stacked in a vertical upright position.

PROJECT CONDITIONS 1.6

Field Measurements: Verify actual dimensions of openings by field measurements A. before fabrication.

1.7 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- Building Information Modeling (BIM) Support: Utilize designated BIM software tools and B. obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

1.8 WARRANTY

- Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair A. or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 **MANUFACTURERS**

- Manufacturers: Subject to compliance with requirements, provide steel doors and A. frames from a SDI Certified manufacturer:
 - 1. CECO Door Products (C).

- 2. Curries Company (CU).
- 3. Pioneer Industries (PI).

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.
- B. Exterior Doors (Energy Efficient): Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model, ANSI/SDI A250.4 for physical performance level, and HMMA 867 for door construction.
 - 1. Design: Flush panel.
 - 2. Core Construction: Foamed in place polyurethane and steel stiffened laminated core with no stiffener face welds, in compliance with HMMA 867 "Laminated Core".
 - a. Provide 22 gauge steel stiffeners at 6 inches on-center internally welded at 5" on- center to integral core assembly, foamed in place polyurethane core chemically bonded to all interior surfaces. No stiffener face welding is permitted.
 - b. Thermal properties to rate at a fully operable minimum U-Factor 0.37 and R-Value 2.7, including insulated door, thermal-break frame and threshold.
 - c. Kerf Type Frames: Thermal properties to rate at a fully operable minimum U-Factor 0.38 and R-Value 2.6, including insulated door, kerf type frame, and threshold.
 - 3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053 inch 1.3-mm) thick steel, Model 2.
 - 4. Vertical Edges: Vertical edges to be mechanically interlocked with hairline seam. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
 - 5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel

- closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
- 6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".
- 7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 - 3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch 1.0-mm) thick steel, Model 2.
 - 4. Vertical Edges: Vertical edges to have the face sheets spot welded and filled full height with an epoxy filler. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
 - 5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
 - 6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
 - 7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- D. Manufacturers Basis of Design:
 - 1. Curries Company (CU) Polystyrene Core 707 Series.
 - 2. Curries Company (CU) Energy Efficient 777 Trio-E Series.

2.4 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Thermal Break Frames: Subject to the same compliance standards and requirements as standard hollow metal frames. Tested for thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400. Where indicated provide thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate with 1/16" positive thermal break and integral vinyl weatherstripping.

- Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.
 - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 - 2. Frames: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
- D. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
 - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 - 2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
- E. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- F. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.6 LOUVERS

- A. Metal Louvers: Unless otherwise indicated provide louvers to meet the following requirements.
 - 1. Blade Type: Vision proof inverted V or inverted Y.
 - 2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.
- B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.
 - 1. Manufacturers: Subject to compliance with requirements, provide louvers to meet rating indicated.

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2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

2.7 LIGHT OPENINGS AND GLAZING

- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.
- B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed in order to match the finish of the door.
- C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.
- D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

2.8 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.9 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Doors:

- 1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
- 2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.

- 3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
- Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
- 5. Electrical Raceways: Provide hollow metal doors to receive electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware". Wire nut connections are not acceptable.

D. Hollow Metal Frames:

- 1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
- 2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
- 3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
- 4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
- Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
- 6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
- 7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
- 8. Electrical Knock Out Boxes: Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; including but not limited to, electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches, electric strikes, magnetic locks, and jamb mounted card readers as specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".

- a. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
- b. Conduit to be coordinated and installed in the field (Division 26) from middle hinge box and strike box to door position box.
- c. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Section "Door Hardware".
- d. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.
- 9. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
- 10. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 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 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
- 11. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
- 12. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.
- E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
 - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.

- 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
- Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
- 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.10 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
 - Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and fieldapplied coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 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 and NFPA 80 at fire rated openings.
 - Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
 - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

3.5 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

END OF SECTION 081113

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SECTION 081400 -WOOD DOORS

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of the furnishing of all plant, labor, materials, accessories, incidentals and the like necessary and/or required for the complete execution of wood door work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - Provide wood door units as scheduled. Doors shall be in veneer, configuration and size as scheduled. Leaves, as and/if required by schedules, shall carry U.L. Label for Classification of Fire Door so noted in said schedule.
 - 3. Provide factory cutouts in doors for lights, louvers, sound gasketing and the like, reinforce with full blocking.

NOTE: Coordinate all work of this Section with Section 08 71 00 for hardware.

- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. 06 20 00 and 08 71 00 Furnishing and installation of finish hardware, coordinate with same for blocking requirements & provide as required
 - B. 08 11 00 Furnishing and installation of hollow metal work

1.4 QUALITY ASSURANCE

ATTENTION IS DIRECTED TO ARTICLE 1.03 OF SECTION 06 20 00 WHEREIN ANY MILLWORK SHOP OR DOOR MANUFACTURER SUPPLYING WORK HEREIN SHALL BE A "CERTIFIED SHOP" UNDER TERMS AND CONDITIONS ESTABLISHED WITHIN THE CERTIFICATION PROGRAM OF THE ARCHITECTURAL WOODWORK INSTITUTE. Further, all doors furnished under this Section shall be "certified" as to content of woods/veneers obtained from sustainable resources as outlined in Section 06 20 00.

- A. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum 3 years documented experience. Further, the door manufacturer shall certify that:
 - 1. The certified products have been tested per WDMA test methods and fulfill the performance duty requirements.
 - 2. Systems are in place to ensure the fabrication methods used produce certified products:
 - 3. The manufacturing processes utilized conform to the documented systems presented.
 - 4. The appropriate systems are in place to select the specified veneers per the required AWS Quality Grades.
- B. All materials furnished under this Section shall conform to the basic requirements of the Architectural Woodwork Institute as defined in AWI Quality Standards,

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Section 1300 & 1500, 8th Edition, Version 2.0, 2005 and ANSI/NWMA I.S. 1-A.

Maximum allowable warp or twist, 1/4 inch as defined and qualified in the National Woodwork Manufacturers Association standard door guarantee.

All units shall, unless specified to the contrary in 1.01.A above, be fabricated to "**CUSTOM**" standards as established under AWI 1300.

- C. Ratings required by drawings and/or specifications are in accordance with NFPA Standards for Fire Doors & Windows, NFPA #80, latest edition and NFPA Life Safety Code #101 Section 6-2 Construction and Compartmentation.
- D. All materials used for work of this Section shall conform with voluntary Product Standards and Trade Associations Units as follows:
 - 1. Architectural Woodworking Institute (AWI)
 - 2. American Society for Testing and Materials (ASTM)
 - 3. Underwriters' Laboratories, Inc. (UL)
 - 4. National Fire Protection Association (NFPA)
 - 5. Warnock-Hersey Certification Listings for fire doors.

1.5 SUBMITTALS – Coordinate with Section 01 33 00

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Shop drawings illustrating door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, identifying cutouts for glazing, louvers, and the like required by the installation.
- B. Product data indicating door core materials and construction; veneer species, type and characteristics; factory machining criteria, factory finishing criteria, and the like required by the installation.
- C. Samples:
 - 1. Submit samples of door veneer, 12 inches square illustrating wood grain, stain color, and sheen. Samples shall include mockup of "saw cut" and grain for pattern work.
 - 2. Corner section sample of doors furnished under this section.
- D. Manufacturer's installation instructions with special installation instructions, if any.

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- E. Certification of Specification Compliance.
- F. Door schedule.
- G. Material Safety Data Sheet (MSDS) must be submitted for each product.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)

- A. No doors shall be cut down to fit openings smaller than intended.
- B. Adequately protect all doors against damage during transportation and job storage. Deliver all materials to the building in perfect condition.
- C. Protect doors with resilient packaging. 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. Break seal on-site to permit ventilation.
- D. Finish doors in accordance with Section 1500 of AWI Standards using grades specified in Part 2.

1.7 SPECIAL GUARANTEE/WARRANTY TERMS

- A. Guarantee shall be delivered in writing by the manufacturer and shall cover doors to be free from defects which shall render them unsuitable for intended use; such as warpage in excess of 1/4 inch in 8 feet; and shall include replacement, rehanging and refinishing at no cost to Owner.
 - 1. Interior solid bonded core leaves Life of the Installation.

Warranty shall include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, telegraphing core construction, etc..

1.8 WASTE MANAGEMENT – Coordinate with Section 01 74 19

A. Separate corrugated cardboard packaging in accordance with the Waste Management Plan and place in designated areas for recycling

1.9 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 FLUSH DOOR TYPES

A. Flush interior Doors: 1-3/4 inches thick; solid core construction-conventional, fire rated and acoustic rated; AWI type construction as indicated.

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B. APPROVED MANUFACTURERS – VT Industries, Mohawk, Graham, Marshfield Door Systems, Algoma, Hardwood Products, or Egers.

2.2 FLUSH DOOR CONSTRUCTION

- A. Solid Core Specifications
 - 1. Solid, Non-Rated: AWI Section 1300, Type SCL-Structural Composite Lumber.

<u>NOTE</u>: "PC5" doors are an acceptable alternate to above units provided that blocking is provided at all hardware locations; this information must be included on the shop drawing submittal; without this information, submittal will be returned. Hardware supplier shall review submittal prior to submission and sign that all provisions for required hardware have been included.

- 2. Solid, Fire Rated: AWI Section 1300, Type "FD*" with "*" denoting ratings as required by schedule and location within building complete with blocking provided at all hardware locations; this information must be included on the shop drawing submittal; without this information, submittal will be returned. Hardware supplier shall review submittal prior to submission and sign that all provisions for required hardware have been included.
- 3. Solid, Special Function: AWI Section 1300, Type SR Sound Retardant/Acoustical.
- B. Facing: AWI "A" grade quality.
 - 1. Wood
 - a. Species Red Oak
 - b. Cut Plain Sliced
 - c. Matching Slip
- C. Facing Adhesive: Type I waterproof.

2.3 DOOR ACCESSORIES

- A. Metal Louvers: Specified in Section 08 11 00.
- B. Vision Panel and Louver "Glazing" Stops:
 - 1. Wood, of same species as door facing.
 - 2. Wood with metal clips for rated doors.

2.4 FLUSH DOOR FABRICATION

- A. Fabricate non-rated doors in accordance with AWI Quality Standards requirements for that construction as specified.
- B. Fabricate fire rated doors in accordance with AWI Quality Standards and to fire rating agency requirements. Attach fire rating label to door.
- C. Astragals/Wrap Arounds for Fire Rated Double Doors: fully mortised, adjustable spring loaded intumescent system similar and equal to Zero (557FS/56FS); metal finish as directed by Architect. System shall provide positive pressure seal.
- D. If cores other than "structural composite lumber" OR "staved lumber core" are used, provide hardware reinforcement blocking in sizes, locations and types as required by hardware schedule requirements.
- E. Vertical Exposed Edge of Stiles: Natural Wood Doors Hardwood of same

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species as veneer facing either lumber or veneer over hardwood or "SCL". Joints, if allowed, are governed by the Quality Standard for class of construction.

- F. Top and Bottom Edges: Mill option wood or "SCL" for all classes other than "Premium".
- G. Fit door edge trim to edge of stiles after applying veneer facing.
- H. Bond edge banding to cores.

2.5 PRE-MACHINING

- A. Carefully mortise, drill or machine as required at the door manufacturer's factory for finish hardware as listed in Hardware Schedule; it should be noted that manufacturer shall provide pilot holes for all hinges, lock fronts and other templated hardware.
- B. Obtain hardware manufacturer's template for use during machining.
- C. Verify hardware locations and hand of door prior to machining.
- D. Protect all cutouts, etc., with 2 coats of varnish or other approved sealer compatible with nominated finish system.
- E. The factory shall assume the responsibility of properly coordinating the approved hardware schedule door schedule and hollow metal door frame shop drawings.

2.6 DOOR SEALING/PRIMING AND FINISHING

- A. Factory finish doors in accordance with AWI Quality Standard Section 1500 to the following finish designations:
 - 1. AWI System "Catalyzed Vinyl" or "Conversion Varnish" with color stain to be selected by the Architect as standard with the nominated manufacturer.
 - 2. Quality: "Custom"
 - 3. Sheen: 40 Satin

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install doors in accordance with WDMA I.S.1 requirements.
- B. Coordinate installation of glass and glazing.
- C. Install door louvers plumb and level.
- D. Coordinate installation of doors with installation of metal frames specified in Section 08 11 00 and hardware specified in Section 08 71 00. Glass, as required, is specified in Section 08 80 00.
- E. Adjust door for smooth and balanced door movement.
- F. Tolerances: Conform to WDMA requirements for fit and clearance tolerances and maximum diagonal distortion.

End of Section

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SECTION 083100 - ACCESS DOORS/PANELS

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

A. The work of this Section consists of the furnishing, by all Prime Contractors and Subcontractor, of access doors for access to all concealed valves, shock absorbers, to all other concealed parts of the plumbing, heating, fire protection and electrical systems that require accessibility for the proper operation and maintenance of the systems to the General Contractor for installation assignments <u>as well as</u> access to spaces indicated on the drawings.

Access doors in gypsum and/or plaster work or masonry will be installed under the respective phases of operations governing substrates in which units are to be installed.

- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. 04 20 00 Unit Masonry
 - B. 09 29 00 Gypsum Drywall
 - C. Mechanical and electrical special conditions and related individual sections (Section 01 31 13 and Divisions 21, 22, 23 and 26)

1.4 QUALITY ASSURANCE

- A. All materials shall be delivered to the job site in unopened factory sealed containers clearly labeled as to product, manufacturer and other pertinent characteristics.
- B. Materials shall be stored under conditions recommended by the manufacturer.
- C. Fire Rated Doors:
 - Fire Rated Access Doors For Walls: Complete assemblies complying with Underwriter's Laboratories, Inc (UL) requirements for 1-1/2 hour "B Label" rating. Identify each assembly with UL label.
 - 2. Fire Rated Access Doors For Ceilings: Complete assemblies complying with Warnock Hersey (WHIG) requirements for one-hour combustible and one-hour non-combustible floor/ceiling systems. Identify each assembly with WHI label and additional NFPA label indicating "For Horizontal Installation".
- 1.5 SUBMITTALS Coordinate with Section 01 33 00
 - Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.

- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Shop drawings of all fabricated items showing complete construction details, erection requirements and fastenings.
- B. Full size samples of units to be incorporated in the work. Samples shall be incorporated as part of the contract obligations.
- C. Certification of Specification Compliance.
- D. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)

- A. All materials shall be delivered to the job site in unopened factory sealed containers clearly labeled as to product, manufacturer and other pertinent characteristics.
- B. Materials shall be stored under conditions recommended by the manufacturer.

1.7 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 GENERAL

A. Access panels except as specified herein shall be factory prime painted and furnished with cylinder lock and two keys; keying instructions will be available from the Owner, units shall be masterkeyed.

B. Access panels where not required to be locked and in gypsum ceilings shall be as specified in Article 2.0* hereinbelow.

2.2 FABRICATION

- A. Fabricate access door assemblies as integral units complete with all parts and ready for installation.
- B. Fabricate units of continuous welded steel construction unless otherwise indicated or specified. Grind welds smooth and flush with adjacent surfaces.
- C. Attachment devices shall be of size and type required to secure access doors to types of supports indicated on the Drawings.
 - 1. Allowable Size Variations: Manufacturer's standard size units which vary slightly from the sizes indicated may be acceptable, subject to the approval of the Architect.

2.3 MECHANICAL/ELECTRICAL PANELS

- A. Units shall be in design and as manufactured in accordance with the following -
 - 1. Acoustical Tile Karp (KSTC [concealed grid] or KSTE [lay-in ceiling systems]); Milcor; Nystrom, Inc.; Larsens; MM Systems Corp. or approved equal.
 - 2. Concrete and Masonry Surfaces Karp (DSB-214 SM); Milcor; Nystrom, Inc.; Larsens; MM Systems Corp.; or approved equal.
 - 3. Drywall Surfaces LOCKABLE
 - a. Ceilings Karp (KSTDW); Nystrom, Inc.; Larsens; MM Systems Corp. or approved equal.
 - b. Walls Karp (RDW); Nystrom, Inc.; Larsens; MM Systems Corp. or approved equal.
 - c. Alternative recessed panel to receive gypsum finish see Article 2.0* below.
 - 4. Plaster Surfaces Karp (DSC-214 PL); Milcor; Nystrom, Inc.; Larsens; MM Systems Corp.; or approved equal.

2.4 GLASS FIBER REINFORCED GYPSUM ACCESS PANELS

A. Glass fiber reinforced gypsum units for use in areas not requiring LOCKING DEVICES shall be designed to blend seamlessly into a dry wall ceiling. The unit shall consist of a surround frame with pre-drilled fastener holes and tapered edge for a tape joint and a drop-in door.

B. TECHNICAL DATA

1	Shell Thickness	1/8" to 3/16"
2	Fastener Test Pull Out (wood stud)	525 lb avg.
3	Fastener Test Pull Out (metal stud)	215 lb avg.
4	Fastener Push Through Test	350 lb avg.
5	Fuel Contribution (ASTM E84-80)	0
6	Flame Spread (ASTM E84-80)	0
7	Smoke Index (ASTM E84-80)	0
8	Combustion (ASTM E84-80)	Non-combustible
9	Class A	Non-Rated
10	Moisture Resistant	
11	Zero Mold and Fungus Growth	

2.5 ADDITIONAL REQUIREMENTS AND RESTRICTIONS

- A. Where units occur within rated assemblies, provide rated access doors in "B" Label construction conforming to Underwriters Laboratories File #R-10808 and/or Warnock Hersey File #U-51468 and similar and equal to those as manufactured by the above and shall be either insulated (KRP-350R) or uninsulated (KRP-450FR) as conditions dictate.
- B. Units shall be fully galvanized construction where used on exterior.
- C. Units within "wet" areas shall be of stainless steel construction.
- D. All units shall be equipped with suitable anchorage devices for securement to intended substrates.

<u>NOTE</u>: Refer to Sections 05 50 00 and 08 11 00 as well as Divisions 21, 22, 23 and 26 so as to avoid possible conflict and/or duplication, work included in said sections and divisions will govern project requirements.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 INSTALLATION

- A. Locate all access doors in a workmanlike manner also in closets, storage rooms and/or other non-public areas, positioned so that the junction can be easily reached and the size shall be sufficient for this purpose (minimum 16 inch by 16 inch).
- B. When access doors are required in corridors, lobby or other habitable areas, locate as directed by the Architect.
- C. Units shall be installed in required substrates by respective trades, true to line and level in accordance with approved shop drawings.
- D. All operating units shall be adjusted and left in perfect working order.

3.3 CLEANUP AND PROTECTION

A. All debris resulting from construction operations will be removed daily and upon final completion, all operating parts will be cleaned and protection removed.

3.4 WASTE MANAGEMENT – Coordinate with Section 01 74 19

- A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
- B. Set aside and protect materials suitable for reuse and/or remanufacturing.
- C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

End of Section

SECTION 087100 - DOOR HARDWARE

NOTE: Door hardware for this Project shall be provided by the Owner and installed by the Contractor.

Contractor shall include work for coordination with the Owner, required logistics, handling and storage of Owner supplied materials, and all required submittals listed within this section. Door hardware schedule included in this section shall be utilized by the Contractor for reference and coordination purposes. Contractor shall coordinate as required with new and existing door and frame assemblies. See Section 011000 Summary of Work for additional information.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Electromechanical door hardware.
 - 3. Cylinders specified for doors in other sections.

C. Related Sections:

- 1. Division 08 Section "Hollow Metal Doors and Frames".
- 2. Division 08 Section "Flush Wood Doors".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI 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.

- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
 - ANSI/BHMA Certified Product Standards A156 Series.
 - 2. UL10C Positive Pressure Fire Tests of Door Assemblies.
 - 3. ANSI/UL 294 Access Control System Units.
 - UL 305 Panic Hardware.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. 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."
 - 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.
 - h. Warranty information for each product.
 - 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.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
 - 1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access

control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

- a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
- b. Complete (risers, point-to-point) access control system block wiring diagrams.
- c. Wiring instructions for each electronic component scheduled herein.
- 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. 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.

E. Informational Submittals:

- 1. 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 Procedures.

1.4 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. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door 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.
- D. 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 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.
- E. Access Control Manufacturers Qualifications: Engage qualified manufacturers with a minimum of five (5) years of documented experience in providing access control and security systems

equipment and software similar to that indicated for this Project and that have a proven record of successful in-service performance.

- 1. Software and access control systems components to have been previously and thoroughly tested together with proven installations similar in size and functionality to the design requirements indicated for this Project.
- F. System Integrator Qualifications: Systems Integrators, verifiably factory trained and certified by the primary product manufacturers, with a minimum of three (3) years documented experience installing complete integrated access control systems similar in material, design, and scope to that indicated for this Project and whose work has resulted in construction with a proven record of successful in-service performance.
- G. Installer Qualifications: Certified technicians, verifiably authorized with the primary product manufacturers for installation of IP-Enabled, Wireless, and Power-over-Ethernet Access Control products in accordance with documented instructions and NFPA 80.
 - 1. ASSA ABLOY access control products are required to be installed only through designated "Preferred Installers."
- H. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
 - 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- I. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- J. 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.
- K. 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
- L. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 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".

1.6 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 Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: 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.

1.7 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.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

- 1. Structural failures including excessive deflection, cracking, or breakage.
- 2. Faulty operation of the hardware.
- 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- 4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

1.8 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.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity:
 - 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.

- 2. 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" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" heavy weight.
- 3. 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.
- 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, 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.
- Manufacturers:
 - a. McKinney (MK) TA/T4A Series, 5 knuckle.

2.3 POWER TRANSFER DEVICES

- A. 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. Manufacturers:
 - a. Securitron (SU) EL-CEPT Series.
- B. 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 throughdoor 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 (MK) Electrical Connecting Kit: QC-R001.
 - b. McKinney (MK) Connector Hand Tool: QC-R003.
 - Manufacturers:

a. McKinney (MK) - QC-C Series.

2.4 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.
 - 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
 - 2. Furnish dust proof strikes for bottom bolts.
 - 3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
 - 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
 - 5. Manufacturers:
 - a. Rockwood (RO).
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
 - 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 - 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 - 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 - 4. Pulls, where applicable, shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
 - 5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
 - 6. Manufacturers:
 - a. Rockwood (RO).

2.5 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
 - 1. Manufacturers:
 - a. Sargent Manufacturing (SA).
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

- 1. Threaded mortise cylinders with rings and cams to suit hardware application.
- 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
- 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
- 4. Tubular deadlocks and other auxiliary locks.
- 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
- 6. Keyway: Match Facility Standard.
- C. Keying System: Each type of lock and cylinders to be factory keyed.
 - 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 - 3. Existing System: Key cylinders to match Owner's existing system.
 - 4. Registry # 70510430 for Orange Ulster; 6-Pin; RN keyway; SKD's RE keyway.
- D. Key Quantity: Provide the following minimum number of keys:
 - 1. Change Keys per Cylinder: Two (2)
 - 2. Master Keys (per Master Key Level/Group): Five (5).
 - 3. Construction Keys (where required): Ten (10).
- E. Construction Keying: Provide construction master keyed cylinders.
- F. Key Registration List (Bitting List):
 - 1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
 - 2. Provide transcript list in writing or electronic file as directed by the Owner.

2.6 KEY CONTROL

- A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
 - Manufacturers:
 - a. Lund Equipment (LU).
 - b. MMF Industries (MM).
 - c. Telkee (TK).

2.7 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed.
 - 1. Locks shall meet or exceed the requirements of ANSI/BHMA A156.2 Series 4000, Grade 1 with all standard trims, as follows:

- a. Cycle Test: ANSI/BHMA A156.2 Grade 1 requirements with no lever sag.
- b. Abusive Locked Lever Torque: Exceed 3,100 in-lb with no entry; lock to maintain egress functionality in compliance with BHMA certification requirements.
- Offset Lever Pull: Exceed 1,600 lbs with no entry (8 times ANSI/BHMA A156.2 requirements).
- d. Latch Retraction with Preload: Exceed 100 lb preload while maintaining ANSI/BHMA requirements for operation in warped doors (2 times ANSI/BHMA A156.2 requirements).
- 2. Vertical Impact: Exceed 100 vertical impacts (20 times ANSI/BHMA A156.2 requirements).
- 3. Furnish with solid cast levers, standard 2 3/4" backset, and 1/2" (3/4" at paired openings) throw brass or stainless steel latchbolt.
- 4. Locks are to be non-handed and fully field reversible.
- 5. Manufacturers:
 - a. Sargent Manufacturing (SA) 10X Line.

2.8 APERIO WIRELESS ACCESS CONTROL

- A. Wireless Access Control Cylindrical Locks: Wireless technology ANSI/BHMA A156.2 Series 4000 Grade 1 cylindrical lockset with integrated card reader and request-to-exit signaling in one complete unit. Separate DPS connects directly to lock electronics for door position (open/closed status) monitoring. Motor driven locking/unlocking control of the lever handle trim with 1/2" deadlocking stainless steel latch. Lock is U.L listed and labeled for use on up to 3 hour fire rated openings.
 - Wireless access control cylindrical locks interface using local wireless connection between the lock unit and a nearby communication hub. Communication hub connected via RS-485 or Wiegand to a new or existing online electronic access control system platform.
 - 2. Fully-encrypted AES 128 wireless communication between lock and communication hub (IEEE 802.15.4, 2.4 GHz) with no proprietary programming device requirements. Locks will continue functional operation independent of wireless connection slowdown or failure.
 - 3. Integrated reader supports HID® 125kHz proximity credentials; or ISO 14443 A/B and ISO 15693 13.56 MHz contactless credentials: HID® iCLASS/iCLASS SE (full authentication, all formats), MIFARE Classic, DESFire EV1 (full authentication, all formats); or Near Field Communications (NFC); or HID® SIO enabled.
 - 4. Support for HID Mobile Access via Bluetooth Low Energy (BLE) short-range wireless communication.
 - 5. Power Source: 6 AA alkaline batteries power supply with LED indication of locked, programming mode and low capacity warning status conditions.
 - 6. Outside lever rigid except when valid user code is entered. Emergency override access capability with optional mechanical key cylinder retraction of lock latch bolt without necessary electronic activation.
 - 7. Communication Hub: Provide the necessary number of hubs which is connected to the access control system via RS-485 or Wiegand as required by the system. Provide hubs factory paired with the locks, but allow for field configuration as needed.

- 8. Complete installation to include manufacturer's Installation Tool and USB Radio Dongle for initial lock set-up and configuration. Electronic on-line access control system platform, including communication cabling and software, by others.
- 9. Manufacturers:
 - a. Sargent Manufacturing (SA) IN100 10 Line Series.

2.9 INTEGRATED WIRED OUTPUT LOCKING DEVICES - MULTI-CLASS READER

- A. Integrated Wired Output Multi-Class Cylindrical Locks: Wiegand or Open Supervised Device Protocol (OSDP) output ANSI A156.2, Grade 1, Cylindrical Lockset with integrated card reader with or without keypad option, and request-to-exit signaling in one complete unit. Hard wired, solenoid driven locking/unlocking control of the lever handle trim with 1/2" deadlocking stainless steel latch. Lock is U.L listed and labeled for use on up to 3 hour fire rated openings.
 - 1. Open architecture, hard wired platform supports centralized control of locking units with new or existing Wiegand or OSDP compatible access control systems. Inside lever handle (request-to-exit) signaling standard with door position (open/closed status) monitoring (via separately connected DPS).
 - 2. Integrated reader supports the following credentials:
 - a. 125kHz proximity credentials: HID, AWID, Indala, and EM4102.
 - b. 13.56 MHz proximity credentials: HID Secure Identity Object™ (SIO) on iCLASS Seos, HID iCLASS, HID iCLASS SE/SR, MIFARE Classic, DESFire EV1 and EV2.
 - c. 2.4 GHz credentials: Secure Identity Object™ (SIO) on Mobile IDs (Bluetooth Smart)
 - d. ISO14443A/B (PIV-compatible Transparent FASC-N read) available with pivCLASS variant
 - e. NFC-enabled mobile phones
 - f. PIN code only or PIN + credential with keypad option
 - 3. 12VDC external power supply required for reader and lock, with optional 24VDC lock solenoid. Fail safe or fail secure options.
 - 4. Installation requires only one cable run from the lock to the access control panel without requirements for additional proprietary lock panel interface boards or modules.
 - 5. Installation to include manufacturer's access control panel interface board or module where required for Wiegand or OSDP output protocol.
 - 6. Manufacturers:
 - a. Sargent Manufacturing (SA) SN200/SN210 10 Line.

2.10 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:
 - 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. Short-lipped strikes: For locks at double doors.
- 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 A156.36.
 - 4. Dustproof Strikes: BHMA A156.16.

2.11 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
 - 1. Exit devices shall have a five-year warranty.
 - At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 - 3. 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.
 - 4. Except on fire rated doors, provide exit devices with keyed cylinder dogging device to hold the pushbar and latch in a retracted position.
 - 5. 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 required in any case where the door light extends behind the device as in a full glass configuration.
 - 6. Flush End Caps: Provide 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.
 - 7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with 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.

- b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
- 8. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
- 9. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
- 10. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
- 11. Rail Sizing: Provide exit device rails factory sized for proper door width application.
- 12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

2.12 DOOR 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.
 - 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.
 - 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 Americans with Disabilities Act, provide units complying with ANSI 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 as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
 - 1. Heavy duty surface mounted door closers shall have a 30-year warranty.

- Manufacturers:
 - a. Sargent Manufacturing (SA) 351 Series.

2.13 ARCHITECTURAL TRIM

A. Door Protective Trim

- 1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
- Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
- 3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
- 4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
- 5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
- Manufacturers:
 - a. Rockwood (RO).

2.14 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 - 1. Manufacturers:
 - a. Rockwood (RO).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed 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. Manufacturers:
 - a. Norton Rixson (RF).

2.15 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- 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 UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of 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. Manufacturers:
 - 1. Pemko (PE).

2.16 ELECTRONIC ACCESSORIES

- A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
 - 1. Manufacturers:
 - a. Securitron (SU) DPS Series.

- B. Intelligent Switching Power Supplies: Provide power supplies with single, dual or multi-voltage configurations at 12 and/or 24VDC. Power Supply shall have battery backup function with an integrated battery charging circuit. The power supply shall have a standard, integrated Fire Alarm Interface (FAI). The power supply shall provide capability for secondary voltage, power distribution, direct lock control and network monitoring through add on modules. The power supply shall be expandable up to 16 individually protected outputs. Output modules shall provide individually protected, continuous outputs and/or individually protected, relay controlled outputs. Network modules shall provide remote monitoring functions such as status reporting, fault reporting and information logging.
 - 1. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

Manufacturers:

a. Securitron (SU) - AQL Series.

2.17 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.18 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and 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 work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 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.
 - 1. Quantities listed are for each pair of doors, or for each single door.
 - 2. The supplier is responsible for handing and sizing all products.
 - 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

B. Manufacturer's Abbreviations:

- 1. MK McKinney
- 2. RO Rockwood
- 3. SA SARGENT
- 4. RF Rixson
- 5. PE Pemko
- 6. SU Securitron

Hardware Sets

Set: 1.0

Doors: 402, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418 Description: Classroom; Office; Copy - Card Access

3 Hinge (heavy weight) T4A3786 US26D MK 1 Access Control Lock (by Security) SG IN100-10G77-BIPS LL GGMK US26D SA 1 Door Closer 351 P10; O (per part 2) ΕN SA 1 Kick Plate K1050 10" 4BE CSK US32D RO 1 Wall Stop 400 / 403 (as required) US26D RO 1 Head & Jamb Gasketing PΕ

Notes:

Operation: Door is normally closed and locked. Valid card at reader unlocks outside lever for momentary access. Monitoring by door position switch. Free egress at all times. Rotating inside lever will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 2.0

Doors: 409c, 411b, 411c, 415a, 418a Description: Electric; Storage - Card Access

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Access Control Lock (by Security)	SG IN100-10G77-BIPS LL GGMK	US26D	SA
1	Conc Overhead Stop	6ADJ-x36	630	RF
1	Door Closer	351 P10; O (per part 2)	EN	SA
1	Kick Plate	K1050 10" 4BE CSK	US32D	RO
1	Head & Jamb Gasketing	S88BL		PΕ

Notes:

Operation: Door is normally closed and locked. Valid card at reader unlocks outside lever for momentary access. Monitoring by door position switch. Free egress at all times. Rotating inside lever will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 2.1 Doors: 404b

Description: Data - Card Access (hardwired)

3 Hinge (heavy weight)	T4A3786	US26D	MK
1 Access Control Lock (by Security)	SG SN210-10G271 BIPS-0E LL GGM	K US26D	SA
1 Door Closer	351 P10; O (per part 2)	EN	SA
1 Kick Plate	K1050 10" 4BE CSK	US32D	RO
1 Wall Stop	400 / 403 (as required)	US26D	RO
1 Head & Jamb Gasketing	S88BL		PΕ
1 Electric Power Transfer	EL-CEPT	630	SU
1 Door Wiring Harness	QC Series (jamb to device)		MK
1 Frame Wiring Harness	QC Series (jamb to J-box)		MK
1 Position Switch	DPS Series		SU
1 Power Supply	AQL4-R8E1		SU
1 Wiring Diagram	Elevation; Point-to-Point		

Notes:

Operation: Door is normally closed and locked. Valid card at reader unlocks outside lever for momentary access. Monitoring by door position switch. During a loss of power the door will remain latched, but

unlocked. Free egress at all times. Lock status will change to latched, but unlocked when the fire detection/suppression systems are activated. Rotating inside lever will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 3.0

Doors: 409a, 409b, 416a, 418b

Description: Storage Pair - Card Access

6	Hinge (heavy weight)	T4A3786	US26D	MK
2	Flush Bolt	555 / 557 (as required)	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Access Control Lock (by Security)	SG IN100-10G77-BIPS LL GGMK	US26D	SA
2	Conc Overhead Stop	6ADJ-x36	630	RF
1	Door Closer	351 P10; O (per part 2)	EN	SA
2	Kick Plate	K1050 10" 4BE CSK	US32D	RO
1	Head & Jamb Gasketing	S88BL		PΕ
1	Astragal (flat bar)	357C		PΕ

Notes: Coordinate overhead stops with fire door mfrs Listings and provide Rixson 10 Series along with proper closer arm/offset bracket where conflict exists.

Operation: Door is normally closed and locked. Valid card at reader unlocks outside lever for momentary access. Monitoring by door position switch. Free egress at all times. Rotating inside lever will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 4.0

Doors: 401, 404a

Description: Elev Lobby Sgl - Card Access; Fail-Safe

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Access Control Lock (by Security)	SG SN210-10G270 BIPS-0E LL GGMI	K US26D	SA
1	Door Closer	351 P10; O (per part 2)	EN	SA
1	Kick Plate	K1050 10" 4BE CSK	US32D	RO
1	Wall Stop	400 / 403 (as required)	US26D	RO
1	Head & Jamb Gasketing	S88BL		PΕ
1	Electric Power Transfer	EL-CEPT	630	SU
1	Door Wiring Harness	QC Series (jamb to device)		MK
1	Frame Wiring Harness	QC Series (jamb to J-box)		MK
1	Position Switch	DPS Series		SU
1	Power Supply	AQL4-R8E1		SU
1	Wiring Diagram	Elevation; Point-to-Point		

Notes:

Operation: Door is normally closed and locked. Valid card at reader unlocks outside lever for momentary access. Monitoring by door position switch. During a loss of power the door will remain latched, but unlocked. Free egress at all times. Lock status will change to latched, but unlocked when the fire detection/suppression systems are activated. Rotating inside lever will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 5.0 Doors: 400e

Description: Corridor / Roof Vestibule Pair - Card Access (hardwired)

6	Hinge (heavy weight)	T4A3786	US26D	MK
2	Flush Bolt	555 / 557 (as required)	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Access Control Lock (by Security)	SG SN210-10G271 BIPS-0E LL GGMF	US26D	SA
1	Door Closer	351 P10; O (per part 2)	EN	SA
2	Kick Plate	K1050 10" 4BE CSK	US32D	RO
2	Wall Stop	400 / 403 (as required)	US26D	RO
1	Head & Jamb Gasketing	S88BL		PΕ
1	Gasketing	2891AS (head & jambs)		PΕ
2	Sweep	18061CNB		PΕ
1	Meeting Stile Seal	S772BL		PΕ
1	Astragal (flat bar)	357C		PΕ
1	Electric Power Transfer	EL-CEPT	630	SU
1	Door Wiring Harness	QC Series (jamb to device)		MK
1	Frame Wiring Harness	QC Series (jamb to J-box)		MK
2	Position Switch	DPS Series		SU
1	Power Supply	AQL4-R8E1		SU
1	Wiring Diagram	Elevation; Point-to-Point		

Notes:

Operation: Door is normally closed and locked. Valid card at reader unlocks outside lever for momentary access. Monitoring by door position switch. Free egress at all times. Rotating inside lever will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 6.0

Doors: 403, 404

Description: Multi-Fixture Toilet - Card Access

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Access Control Lock (by Security)	SG IN100-10G77-BIPS LL GGMK	US26D	SA
1	Door Closer	351 P10; O (per part 2)	EN	SA
1	Kick Plate	K1050 10" 4BE CSK	US32D	RO
1	Mop Plate	K1050 6" 4BE CSK	US32D	RO
1	Wall Stop	400 / 403 (as required)	US26D	RO
1	Head & Jamb Gasketing	S88BL		PΕ

Notes:

Operation: Door is normally closed and locked. Valid card at reader unlocks outside lever for momentary access. Monitoring by door position switch. Free egress at all times. Rotating inside lever will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 7.0 Doors: 411a

Description: Faculty Toilet - Card Access

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Access Control Lock (by Security)	SG IN100-82277-BIPS LNNJ	US26D	SA
1	Outside Occupancy Indicator	185P	US26D	SA
1	Door Closer	351 P10; O (per part 2)	EN	SA
1	Kick Plate	K1050 10" 4BE CSK	US32D	RO
1	Mop Plate	K1050 6" 4BE CSK	US32D	RO
1	Wall Stop	400 / 403 (as required)	US26D	RO
1	Head & Jamb Gasketing	S88BL		PΕ

Notes:

Operation: Door is normally closed and locked. Valid card at reader unlocks outside lever for momentary access. Monitoring by door position switch. Privacy button locks out all credentials except for emergency override card. Free egress at all times. Rotating inside lever will activate request to exit switch for appropriate monitor by EAC systems. No outside key override.

Set: 8.0 Doors: 400

Description: Storage

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Storeroom/Closet Lock	SG 10XG04 LL GGMK	US26D	SA
1	Door Closer	351 P10; O (per part 2)	EN	SA
1	Kick Plate	K1050 10" 4BE CSK	US32D	RO
1	Wall Stop	400 / 403 (as required)	US26D	RO
3	Silencer	608-RKW		RO

Set: 9.0

Description: NOT USED - Storage Pair

6	Hinge (heavy weight)	T4A3786	US26D	MK
2	Flush Bolt	555 / 557 (as required)	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom/Closet Lock	SG 10XG04 LL GGMK	US26D	SA
2	Conc Overhead Stop	6ADJ-x36	630	RF
1	Door Closer	351 P10; O (per part 2)	EN	SA
2	Kick Plate	K1050 10" 4BE CSK	US32D	RO
2	Silencer	608-RKW		RO

Set: 10.0

Description: NOT USED - Existing Stair Door - Add Fail-Safe Card Access

	E " O (E " D . :	40 FE 0075 FTL 0014/	110000	~ ^
1	Fail Safe Exit Device	12 55 8875 ETL GGMK	US32D	SA
1	Electric Power Transfer	EL-CEPT	630	SU
1	Door Wiring Harness	QC Series (jamb to device)		MK
1	Frame Wiring Harness	QC Series (jamb to J-box)		MK
1	Card Reader	By Security Vendor		
1	Power Supply	AQL4-R8E1		SU
1	Wiring Diagram	Elevation; Point-to-Point		
1	Remainder of Hardware	Existing to be reused		

Notes: Modify fire rated door and frame in field for new hardware.

Operation: Door is normally closed and locked. Valid card at reader unlocks outside lever for momentary access. Monitoring by door position switch. During a loss of power the door will remain latched, but unlocked. Free egress at all times. Lock status will change to latched, but unlocked when the fire detection/suppression systems are activated. Depressing pushrail will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

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Set: 11.0

Doors: EX1, EX3

Description: Existing Stair Door - Modify for Passage Function

1 Dummy Cylinder w/ Collar Coord w/ existing hardware US26D

Notes: Modify existing hardware to provide passage function from stair side. Remove key cylinder and replace with blank dummy cylinder.

Set: 12.0 Doors: Hubs

Description: Access Control Products

8 Hub (by Security) AH30R12 SA

END OF SECTION 087100

SECTION 088000 - GLASS AND GLAZING

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all glass and glazing work of this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - 1. Material requirements and labor restrictions are established herein for work specified in Sections 08 11 00, 08 14 00, 08 40 00, 08 42 00, 08 51 10, 08 63 00, 14 01 20 and 14 42 00.
 - 2. All glass shall have "pencilled" edges where exposed and "flat" or "miter" ground where butt glazed.
 - 3. General exterior glazing All glass for general exterior use, unless scoped otherwise above, shall be of same composition, i.e. NO variation of thickness in glass or unit assembly from one window to another. All glass thickness shall be determined by size of lights for both interior and exterior as well as wind loading for exterior locations.
 - 4. Provide mirror systems, framed and unframed as required. Coordinate with Section 10 28 00. When direct mounted; **provide surface primer** as recommended by the manufacturer of the nominated mastic.
 - 5. Provide fire rated glazing and surround assembly at locations as shown including doors, corridor walls and the like.
 - 6. Provide tempered glass fronts and sliding ballbearing track/hardware for display cases. Coordinate with Sections 101200 and 101201.
 - 7. Perform balance of glazing as may be required by the Drawings and these specifications to complete the glazing requirements of this project.

NOTE:

- Safety Glazing is required by Code and SED:
 - Wherever glazing or any portion of glazing is within 18 inches of a floor or platform riser level.
 - At corridors, wherever glazing is within 48 inches of a floor.
 - o 'Safety Glazing' to be at least 1/4 inch thick 'fully tempered' or 'laminated' glass.
 - Safety Glazing is to bear the certification label of the 'Safety Glazing Certification Council' or another certification agency acceptable to agencies having jurisdiction.
 - Safety Glazing shall further comply with the "Code of Federal Regulations Part 16, CFR 1201" or (AKA) "CPSC 16 CFR 1201" entitled "Safety Standard for Architectural Glazing Materials".
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:

<u>NOTE</u>: Coordinate with specifications for factory glazed units. Material requirements and

labor restrictions outlined herein govern said work.

- A. 05 50 00 Miscellaneous Metals
- B. 06 10 00 Rough Carpentry
- C. 06 20 00 Finish Carpentry
- D. 07 90 00 Caulking and Sealing/Joint Sealants
- E. 08 11 00 Hollow Metal Work
- F. 08 14 00 Wood Doors
- G. 08 40 00 Aluminum Construction
- H. 09 90 00 Painting
- I. 10 28 00 Toilet Accessories

1.4 QUALITY ASSURANCE

All lights within 18 inches of the floor, by CPSC Standard (#42 FR 1428; 16 CFR part 1201) and local jurisdiction labor laws be safety glazed and marked with "hazard advisory" decals in minimum 1-1/2 inch height and in design and color approved and selected for use by the Architect. Material shall be opaque non-reflective vinyl film, 0.0035 inch minimum thickness, with pressure sensitive adhesive backing (mounted or unmounted), suitable for exterior as well as interior applications.

Further as per SED, Section 204-1 requirements, all glazing within 48 inches of the floor in corridor walls, including classroom doors, exit doors and sidelights shall be "safety glazed" as above.

- B. All work of this section shall be in accordance with general industry practice governing glass and glazing and shall be accomplished in accordance with the requirements of the Manual of the Glass Association of North America (GANA) and Sealed Insulation Glass Manufacturers Association,, latest editions, for the surrounds specified and required.
- C. All glazing products shall be labeled as to thickness and type and said labels shall be left in place for inspection until directed to remove same.
- D. Conduct a quality control program that includes the following as a minimum:
 - 1. Inspect conditions and materials to verify conformity with the contract requirements.
 - 2. Inspect conditions and materials and coordinate with the Architect to verify proper substrate preparation in conformance with the contract requirements.
 - 3. Inspect work in progress and during inclement weather to verify that the work is in compliance with established procedures, and that there are no leaks through the curtain wall.

E. Reference Standards (Flat Glass Industry Specifications)

1.	ASTM C 1036-01	Standard Specification for Flat Glass
2.	ASTM C 1048-04	Standard Specification for Heat-Treated Flat
		Glass-Kind HS, Kind FT Coated and Uncoated
		Glass
3.	ASTM C 1172-03	Standard Specification for Laminated Architectural
		Flat Glass
4.	ASTM C 1376-03	Standard Specification for Pyrolytic and Vacuum
		Deposition Coatings on Flat Glass

5.	ASTM E 1300-04 €1	Standard Practice for Determining Load Resistance of Glass in Buildings
6.	ASTM E 2190-02	Standard Specification for Insulating Glass Unit Performance and Evaluation
7.	ANSI Z97.1-04	American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications Method of Test
8.	AAMA	Sealants Manual
9.	GANA	Glazing Manual and Sealant Manual
10.	SIGMA	Sealed Insulating Glass Manufacturers
		Association
11.	ASCE 7	Minimum Design Loads for Buildings and Other Structures
12.	ASTM C 509	Specification for Cellular Elastomeric Pre-Formed Gasket and Sealing Material
13.	ASTM C 794	Test Methods for Adhesion in Peel of Elastomeric
		Joint Sealants
14.	ASTM C 864	Specification for dense elastomeric compression
		seal gaskets, setting blocks and spacers
15.	ASTM D 395	Standard test method for rubber property -
10.	7.6 T.M. 2. 000	Compression set
16.	ASTM D 746	Standard test method for brittleness temperature
	7.6 1.11.2 7.16	of plastics and elastomers by impact
17.	ASTM D 865	Standard test method for rubber - Deterioration by
	ACTIVID GGG	drying in air (test tube enclosure)
18.	ASTM D 897	Tensile testing of adhesive bonds
19.	ASTM D 2240	Standard test method for rubber property -
10.	7.6 T.W. B. 22 To	Durometer hardness
20.	ASTM E 546	Test for dew point of sealed insulating glass units
21.	ASTM E 773	Standard test methods for seal durability of sealed
21.	NOTHIE 770	insulating glass units
22.	ASTM E 774	Standard specification for sealed insulating glass
22.	ASTIVIL 114	units
23.	ASTM 1332	Standard Classification for Determination of
23.	A31W 1332	Outdoor-Indoor Transmission Class
24.	ASTM C 920	Standard specification for elastomeric joint
24.	ASTIVI C 920	sealants
O.F.	ACTM C 1007	
25.	ASTM C 1087	Standard test method for determining compatibility
		of liquid-applied sealants with accessories used in
		structural glazing systems.

- F. Fire Resistance Rated Glass: Each lite shall bear permanent, nonremovable label of UL or WHI certifying it for use in tested and rated fire resistive assemblies.
- G. Fire Protective Glazing Products for Door Assemblies: Products identical to those tested per ASTM E 152 and UL 10B, labeled and listed by UL or other certification agency acceptable to authorities having jurisdiction.
- H. Fire Rated Glazing Code Compliance Requirements
 - 1. ASTM E 119 -Fire Tests of Building Construction and Materials.
 - 2. NFPA 80 Fire Doors and Windows.
 - 3. UL 263 Fire Resistance Ratings.
 - 4. Fire-rated, clear and wireless glazing material for use in locations such as

doors, sidelites, transoms, borrowed lites, and wall applications with fire rating requirements as established herein with hose stream test; for use in interior and exterior applications.

5. Provides protection by reducing the radiant and conductive heat transfer.

1.5 SUBMITTALS – Coordinate with Section 013300

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Product Data Manufacturer's specifications and installation instructions for each type of glass specified herein:
 - 1. Spacers.
 - 2. Compressible filler rod.
 - 3. Mastics/primers and the like.
- B. Samples
 - 1. Glass: 12 inch by 12 inch pieces for each type of glass specified herein.
 - 2. Setting blocks, full size.
 - 3. Color Samples for Glazing Materials: Manufacturer's standard colors.
- C. Calculations: Sealed by a Professional Engineer registered in the jurisdiction of the work, showing the adequacy of the new glass to meet local code requirements; this submittal shall be made in conjunction with engineering requirements set for in Section 08 40 00 and shall be integral with that submission.
- D. Quality Control Submittals
 - 1. Test Reports: Certified test data to sufficiently substantiate glass or glass assembly compliance with requirements specified.
 - 2. Sealant Compatibility Reports: In accordance with ASTM C1087 including rubber glazing to glass and glazing sealants. Include sealant compatibility between sealant, glazing components, and aluminum frame finish. Reports shall address both chemical and adhesion compatibility issues.
 - 3. Submit reports for all quality control tests of shop assembled units.
- E. Certification of Specification Compliance:
 - 1. Affidavit by the material supplier, certifying type and quality of glass furnished.
 - 2. Product Test Listings: From a qualified testing agency indicating fire-rated glass complies with requirements, based on comprehensive testing of

current product.

- 3. Wired Glass: Affidavit by the material supplier, certified as bearing the Underwriter's Laboratories (UL) classification marking for fire resistance.
- F. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)

- A. All glazing materials shall be delivered to the job site in unopened factory sealed containers clearly labeled as to product, manufacturer, color and/or other pertinent characteristics.
- B. Materials shall be stored under conditions recommended by the manufacturer.
- C. All measurements and sizes for the work shall be obtained and verified by the Contractor who shall be responsible for correct and accurate fitting of his work.
- D. Glazing molds shall be removed and replaced in their correct locations in such a manner as not to mar moulding or the screws securing same.
- E. Do not expose fire rated glass to temperatures greater than 120 degrees F during storage and transportation. Do not expose the non-PVB side of glass to UV light.

1.7 GENERAL SYSTEM REQUIREMENTS

- A. Design Loads: Design, fabricate, and install glass to withstand an inward and outward uniform wind pressure as determined by wind-tunnel testing. The minimum design wind pressures are +50 psf/-55 psf.
- B. Glass Statistical Factors (Safety Factor): Glass thicknesses are to be determined by the Contractor and/or glass manufacturer. All glass as shown will be provided in thickness such that the probability of breakage at the "Design Wind Pressure" plus live load will not exceed 1 lite per 1,000 lites. The glass manufacturer shall provide, on request, substantiating glass breakage data if such data is not otherwise available as part of the manufacturer's published data. Minimum single lite thickness is 1/4 in.
- C. Weep System: Each glass glazing rabbet shall be wept. All weeps shall be located at the lowest drainage point of the section to drain all water from the section. Weeps shall consist of three holes/slots located at the center and near the ends of the spans and shall have a dimension of 3/8 in. diameter.

1.8 SEQUENCING

- A. Coordinate with requirements of material and personnel hoists. Defer installation at obstructed areas, and install materials when obstructions are removed.
- B. Coordinate schedule, work, and installation procedure with other trades to ensure construction of conditions shown in Contract Documents, and to ensure protection of building and interior from weather and damage.

1.9 SPECIAL GUARANTEE/WARRANTY TERMS

- A. Provide an extended 10 year guarantee/warranty against breakage of seal system shall be given in addition to standard 1 year term.
- B. Warranty period for Fire-Rated Glass: 5 years from date of shipment by manufacturer.
- C. Guarantee/warranty will be extended to cover both labor and material for total period.

1.10 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Furnish all glass and glazing materials in accordance with the schedules and/or details shown on the contract drawings and in conformance with the following specifications.
- B. The basis of this specification is upon "Solarban 60" by PPG Industries for all exterior glazing other than that used in entrance doors and companion sidelights which shall be clear/clear insulated and tempered assemblies. Products by Cardinal or Viracon shall be considered as equals providing they meet or exceed the following performance characteristics of the specified product. Color is a prime consideration.

60 Performance Values

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	Visible Light	U-	U-Value	SHGC	Shading	Outdoor Visible
	Transmission	Value	Summer		Coefficient	Light Reflectance
		Winter				
	70%	0.29	0.27	0.27	0.44	11%

<u>NOTE</u>: Coating system shall be "hard coat" pyrolytic or "CVD" for all single lights used in dual glazing configurations <u>and</u> "spectrally selective" soft coating for sealed insulating units.

NO SOFT COATING WILL BE PERMITTED ON SINGLE LIGHTS OF GLASS IN ANY LOCATION.

- C. Standard glass material for uncoated float, tempered, obscure and the like with each product conforming to the general guidelines outlined in ASTM C 1036 for flat glass and C 1048 for heat treated glass and E 2188, 2189 and 2190 for sealed insulating glass units.
- D. Glass edges shall be clean scored and cut.
- 2.2 INSULATING GLASS Coordinate with Section 084000 for Performance Chacteristics.
 - A. Units shall be "dual seal" hermetically sealed with a primary butyl rubber, PIB or

- polyisbutylene and secondary seal of polysulfide or silicone sealant as may be standard with the manufacturer <u>and</u> compatible with glazing materials to be used in setting of glass as specified in Section 08 40 00.
- B. Individual lites shall be separated by a roll formed stainless steel or aluminum spacer filled with a low moisture absorbing desiccant similar and equal to "AZON" Clear. Corners of spacer shall be fused, welded or bent as standard with the manufacturer. Spacer welds or solder shall not protrude above spacer surface. Welds and solder joints shall be solid and free of pin holes.
- C. Units shall be certified by the Insulating Glass Certification Council (IGCC) and shall have the IGCC label and "A" classification permanently etched in the corner of each of the insulating units used.
- D. Shading coeficient for all exterior insulated glass = 0.44
- E. Units shall not contain breather or capillary tubes or similar penetrations.
- F. A dew/frost point above -20°F shall constitute seal failure.

2.3 FLOAT GLASS

A. Monolithic annealed glass, "select" quality and thickness required.

2.4 SAFETY GLAZING – Thickness as shown on the drawings and/or required by lite sizes and code compliance.

- A. Tempered float glazing, reference ASTM C 1048.
 - 1. All glass to be of "glazing" quality.
 - 2. Glass shall be heat-treated by horizontal (roller Hearth) process with inherent roller-wave distortion pattern parallel to the bottom edge of the glass as installed.
 - 3. Flatness Tolerances:
 - a. Roller-Wave or Ripple: The deviation from flatness at any peak shall not exceed 0.003 inches as measured per peak to valley for 1/4 inch (6mm) thick glass. Electronic readout per lite is requird as a submittal confirming this fabrication tolerance.
 - b. Bow and Warp: The bow and warp tolerences shall not exceed 1/32 inch per linear foot.
 - 4. Material used for glass railings and glazed wall assemblies shall be "heat soaked" to eliminate occlusions.
 - 5. Glass edges in conjunction with butt glazed wall shall be ground square or "flat ground" as customary in the industry
- B. Laminated safety: 2 lites of clear float laminated with 0.060 inch PVB interlayer. It is the Contractor's responsibility to provide engineering confirmation of deflection criteria conforming to L/650 or 200 psf point loading with a design factor of 2.5.

NOTE: When used in insulated glass configuration, the assembly with be laminated to a 0.030 inch PVB interlayer.

2.5 FIRE RESISTANT GLAZING MATERIALS

- A. Steel
 - 1. Internal tube steel framing shall conform to ASTM A 501. Formed steel retainers shall be galvanized conforming to ASTM A 527.
- 2.6 FIRE RATED GLASS SYSTEMS Safety Design

A. FireLite

- 1. All fire-rated glass designated on the drawings shall be 3/16 inch (5mm) thick FireLite. The surface condition shall be polished.
- 2. Each piece of FireLite is permanently labeled with the FireLite, Warnock Hersey and Underwriters Laboratories logo on sizes up to 3,325 square inches and with the FireLite logo only for sizes that exceed the listing (as approved by the local authority having jurisdiction).
- 3. FireLite shall be glazed into the appropriate fire-rated frame with an approved glazing compound (silicone or closed cell PVC tape), as supplied by the installer.

B. FireLite Plus

- 1. All glass designated on the drawings that is both fire-rated and safety-rated shall be 5/16 inch (8mm) thick FireLite Plus.
- 2. Each piece of FireLite Plus is permanently labeled with the FireLite Plus, Warnock Hersey and Underwriters Laboratories logo on sizes up to 3,325 square inches and with the FireLite Plus logo only for sizes that exceed the listing (as approved by the local authority having jurisdiction).
- 3. FireLite Plus shall be glazed into the appropriate fire-rated frame with an approved glazing compound (silicone or closed cell PVC tape), as supplied by the installer.

C. Fireglass®20

- 1. Thickness: 1/4 inch.
- 2. Weight: 3.0 lbs./sq. ft.
- 3. Approximate Visible Transmission: 89 percent.
- 4. Approximate Visible Reflection: 8 percent.
- 5. Fire-rating: 20 minutes (WITHOUT HOSE STREAM TEST).
- 6. Passes positive pressure test standards UL 10C, UBC 7-2 and UBC 7-4.
- 7. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
- 8. Labeling: Permanently label each piece of Fireglass®20 with the Fireglass®20 logo, UL logo and fire rating in sizes up to 6,396 sq. in.
- 9. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested as a wall assembly in accordance with ASTM E 2074-00 and UL 9, UL 10B and UL10C.
- 10. Fire Protective Glazing Products for Door Assemblies: Products identical to those tested per ASTM E 152 and UL 10B, labeled and listed by UL and/or WHI or other certification agency acceptable to authorities having jurisdiction.
- D. Fire-Rated Wire Glass Pyroshield Plus.
 - 1. Thickness: 7/16 inch [10.5 mm] overall.
 - 2. Weight: 5.6 lbs./sq. ft.
 - 3. Approximate Visible Transmission: 77 percent.
 - 4. Fire-rating: 20, 45, 60 and/or 90 minutes as required by the drawings and locations of use.
 - 5. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I).
 - 6. STC Rating: Approximately 35 dB.
 - 7. Positive Pressure Test: UL 10C, UBC 7-2 and 7-4; passes.
 - 8. Labeling: Permanently label each piece of Pyroshield Plus with the Pilkington logo, UL logo and fire rating in sizes up to 1,296 sq. in.
 - 9. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at

opening locations on drawings, when tested as a wall assembly in accordance with ASTM E 152 and ASTM E 163 and UL 9, UL 10B and UL 10C.

E. Glazing Accessories

1. The glazing material perimeter shall be separated from the perimeter framing system with approved flame retardant glazing tape. The fire resistant glass panels shall be continuously caulked around the edge to the retainer frame utilizing neutral cure silicone similar and equal to G.E. "Silglaze N", clear.

2.7 MIRRORS

- A. Standard units 1/4 inch float "silvering" quality glass with electrolitic application of copper to provide first quality distortion free mirrors. Products shall conform to ASTM C 1503-01.
 - Where frameless, all mirror edges shall be ground and polished to a 45 degree bevel. Apply water-resistant paint to rear side of units prior to setting.
- B. Safety units mirrors for all areas where same are within 18 inches of the floor or where accessible shall be as for "A" above and shall receive a <u>Category II Tape</u> <u>Backing</u> which shall conform to CPSC #16cfr1201 for safety glazing requirements. Units shall be as fabricated by Binswanger Mirror Products or other certified manufacturer.
- C. Mirrors shall be set frameless with mastic specified below.
- D. Mirror Mastic Palmer Products Corp. ("Mirror-Mastic Bond" and "Mirro-Mastic Adhesive"); C. Gunther Company ("Ultra/Bond" and "Extra/Bond") or approved equal. Primer systems: As furnished by nominated mirror mastic manufacturer for intended substrates.
- E. One-way mirror systems in thickness as required. Glass shall meet the requirements of FS DD-G-451D and shall be coated by the manufacturer of the base glass.

2.8 GLAZING ACCESSORIES

- A. Gaskets: Closed cell, extruded neoprene, "epdm" or silicone rubber. Acoustical glazing seals shall be "soft"; interior seals "hard". Extrusions shall be black in color. Corners shall be either vulcanized or premoulded at option of this Contractor. Size, cross section, packaging, corner conditions, etc. shall be determined by the supplier of the retaining sections and the installer of the glass.
- B. Glazing Tape 100% polybutene base material, non-skinning, non-drying, non-oxidizing, extruded of thickness 1/16 inch larger than opening and of sufficient width to provide contact at channel base or bead and finish flush with sight line. Manufacturers Pecora, Tremco, 3M or approved equal.
- C. Wet Sealants, surrounds Acrylic terpolymer, 2 part polysulfide, single component polyurethane, butyl rubber or silicone type sealants judged and certified compatible with edge sealants on sealed units and with glazing surrounds.
- D. Setting and edge blocks Shore "A" hardness of 85 +/- 5; material shall be adjudged compatible with secondary seal of insulated glass or in case of single light, neoprene or "epdm". Spacer blocks as above, Shore "A" of 50 +/- 5. Blocks and spacers shall comply with requirements of AAMA 501.1-94.
- E. Glazing compound standard manufacturer, F.S. TT-G-410E(1)

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 INSTALLATION

- A. All glass and glazing products shall be set in accordance with the applicable setting guides of the "GANA" or "SIGMA" referenced in Paragraph 1.03.C above and as per requirements established by respective window/wall/door manufacturers in the referenced sections.
- B. Surfaces shall be dry and free from dust, rust or ice before glazing. Dirty surfaces shall be cleaned with cloth saturated with turpentine or mineral spirits before glazing.
- C. All sash settings shall be installed in longest practical length. Splices shall be made at joints in glass or as required. All joints shall be butt, anchored and sealed as per manufacturers recommendations.
- D. Mirrors shall be installed using either continuous top and bottom retainer channels or combination of clips and mastics.
- E. Keep the glazing rabbet clean and dry during installation of glass.
- F. Do not glaze units when ambient air temperature is below 40°F and in presence of any moisture.

3.3 NON-STRUCTURAL GLAZING

- A. Refer to Section 084000 for general aluminum framing requirements.
- B. Comply with all general glazing requirements.
- C. Install elastomeric antiwalk blocks at midheight of jamb in each vision glass opening. Antiwalk blocks shall be 1/8 inch narrower than the space between the glass and vertical mullion. Set blocks in dabs of sealant to hold in place.

3.4 INSTALLATION (Fire-Rated Glazing)

- A. Comply with referenced GANA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.
- B. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.
- C. Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.
- D. Place hardwood setting blocks located at quarter points of glass with edge block no more than 6 inches from corners.
- E. Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit; coordinate with Sections 062000 for installation of frames and 081100 for furnishing of fire-rated frames.
- F. Place glazing tape on free perimeter of glazing in same manner described above.
- G. Do not remove protective edge tape.
- H. Install removable stop and secure without displacement of tape.
- I. Do not pressure glaze.
- J. Knife trim protruding tape.

- K. Apply cap bead of silicone sealant along void between the stop and the glazing, to uniform line, with bevel to form watershed away from glass. Tool or wipe sealant surface smooth.
- L. Provide minimum 3/16 inch edge clearance.
- M. Install in vision panels in fire-rated doors to requirements of NFPA 80.
- N. Install so that appropriate UL & Pyrostop markings remain permanently visible.

3.5 MARKING DECALS

A. Install two marking decals on each transparent glass door, and on each transparent glass sidelight which is wider than 20 inches between stiles. Locate decals midway between stiles 34 inches above the floorline.

3.6 REPLACEMENT AND CLEANING

- A. All cracked, broken, scratched, stained or otherwise damaged glass and all glazing improperly set shall be replaced with perfect glass, properly set at no additional cost to the Owner.
- B. Clean glass both sides after painting is complete and dry. Do not disturb glazing with scrapers. Do not use acid solution or water containing caustic soap.
- C. At the time of final acceptance of the work, all glass shall be clean and undamaged and all setting materials in perfect condition.
- D. Coordinate with requirements of Section 017700.

3.7 WASTE MANAGEMENT – Coordinate with Section 017419

- A. Separate float glass and place in designated areas for reuse or recycling (cannot be recycled with beverage-container glass).
- B. Separate tempered glass for use as aggregate or nonstructural fill.
- C. Separate corrugated cardboard in accordance with the Waste Management Plan and place in designated areas for recycling.

End of Section

SECTION 092900 - GYPSUM DRYWALL

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all gypsum drywall cladding, stud framing and accessory work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - 1. Provide partition systems in design configuration shown and/or required to complete the work of the project. Provide acoustical insulation and isolation systems within partitions and surrounds as required by schedules.

NOTE:

- Attention is directed to "flex" requirement at head of all partitions carried to structure above for both regular and "rated" walls.
- Mold and humidity resistant boards shall be provided for all drywall partitions at all locations.
- All partition framing studs shall be a minimum of 4" in depth by minimum 20 gauge or as required by vertical spans under a deflection criteria of L/240.
- 2. Close openings as indicated with steel studs and gypsum.
- 3. Provide interior suspended ceiling construction both directly attached to cross furring and attached to both a rigid and a direct hung suspension system as required by the details and/or loading conditions to be encountered by locations.
- 4. Provide architectural encasement of structural elements in profiles and configurations as shown on the drawings.
- 5. Provide direct lamination of gypsum board wall finish to masonry and elsewhere shown and/or scheduled.
- 6. Provide all required fascia and soffit construction, single or double layer construction as required by conditions and/or details.
- 7. Provide skylight and skydome well treatments as required by drawings and conditions.
- 8. Provide gypsum board fascia treatments in connection with acoustical ceilings as detailed. Coordinate with Section 09 51 00 for custom trim systems.
- 9. Provide freestanding furring installations, single and/or double layer as required to complete the project work.
 - <u>NOTE</u> This includes requirement that in any area scheduled to receive drywall finish, any conduit, pipe, duct or other mechanical/electrical device is running, said furring will be installed.
- 10. Provide drywall furring channels attached, shimmed and leveled to

- substrata and then clad with gypsum finish as required by drawings and/or conditions of the construction.
- 11. Provide "shaftwall" type construction at all locations shown with ratings indicated on the drawings and/or required by code classification.
- 12. Provide continuous 20 gauge steel grounds (steel attachment plates) minimum of 12 inches wide applied horizontally to steel studs to first stud beyond item being secured (both directions) prior to placement of gypsum. Optional system as per Part 2 herein "Danback" system

<u>NOTE</u>: when double layer application, sandwich blocking between first and second layers.

Provide grounds at all locations where casework, counters and/or cabinets, visual display boards, shelf standards, chair rails, hook strips, grab bars and the like are to be anchored to steel grounds with suitable screws and/or bolts. Manufacturer of wall system shall recommend proper method of anchorage.

Where items are to be wall hung or wall mounted including wall hung cabinets, visual display boards and the like, grounds shall be installed at the top and the bottom of these items. Additional grounds shall be installed between the top and bottom grounds for additional points of attachment as may be required by particular application.

Further, where grab bars or carriers are installed, studs should be spaced at 8 or 12 inch centers (within 16 inch and 24 inch stud spaced partition construction respectively) and be blocked with solid treated wood blocking from stud to stud; blocking shall be nominal 2 by 8.

COORDINATE WITH SECTION 06 10 00 AND OTHER SECTIONS FOR THE INSTALLATION OF CONTINUOUS WOOD/STEEL BLOCKING FOR ATTACHMENT OF RAILS, HANGERS, BATTENS AND THE LIKE.

- 13. Provide overhead bracing of all interior partition systems. Tie to structure above.
- 14. Provide low and/or rail wall type partitions. Coordinate with Section 06 20 00 for caps. Framing shall be accomplished using "strut" type stud assemblies as required to insure compliance with applicable provisions of codes governing horizontal thrust resistant.
- 15. Tape and finish all gypsum work in accordance with the following guides as set forth in Part 3 herein.

In absence of specific location of finish, all finishes shall be considered to be "Level 4".

NOTE: As a result of concerns regarding "failures" of coatings and drywall compounds, the following criteria has been developed by the industry for tape and finish applications. It is the Contractor's responsibility to insure compliance with the following. It should be further noted that each of the nominated board manufacturers have "data" sheets addressing the

installation and finishing requirements for their respective boards and uses thereof. Copies of said data sheets <u>must</u> be submitted with the submittal package specified in 1.05 of this Section.

Substrate Preparation: Maintain boards at a minimum temperature of 50 degrees F (10 degrees C), and be dry for at least 48 hours prior to the application of drywall joint compounds, drywall textures, and paints/coatings.

Interior Job Conditions: Continuously maintain a minimum temperature of 50 degrees F (10 degrees C) for the application of the drywall joint compounds, drywall textures, and paints/coatings until dry. The temperature requirements shall be further restricted by that specified in Section 01 50 00. Provide continuous ventilation to allow for proper drying. Utilize, if possible, permanent mechanical systems. Utilize to the greatest extent possible, permanent lighting; job site lighting is generally not representative of final lighting conditions, however all inspections will be made under job site lighting conditions with amplification if deemed necessary by the Architect to approximate final lighting schemes.

All drywall joint compounds shall be dry or, with setting type drywall joint compounds, hardened (set) prior to the application of subsequent coats.

All drywall joint compounds shall be dry prior to the application of drywall textures and paints/coatings.

Application: All joint compounds, textures and paints/coatings shall be mixed and applied in accordance with the nominated manufacturer's recommendations for particular products.

- 16. Provide all metal and/or PVC trim, casing beads, caulking, gaskets, control joints, fasteners, and all other appurtenances indicated on drawings, specified and/or required to provide a complete installation.
- 17. Caulk:
 - a. all openings around pipes, fixtures and the like flush and neat prior to erection of tile finish.
 - b. all door and window frames to surrounds;
 - c. dissimilar materials, i.e. gypsum to concrete, hollow metal to masonry and/or gypsum, concrete masonry and the like both vertical and horizontal
 - d. All gypsum wallboard be installed with a fire sealant bead of 3/8 in. (9 mm) between the floor and the bottom edge of the gypsum; coordinate requirements with Section 07 90 00.
- 18. Install access panels where required using units furnished under terms and conditions set forth in Section 08 31 00. Tie access panels to supplementary framing provided herein.
- 19. Perform balance of gypsum construction as may be required to complete the work of the project.

- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. Furnishing of all door frames, access panels, etc. for installation in drywall construction.

1.4 QUALITY ASSURANCE

- A. All gypsum construction required under this phase of the work shall be performed in strict accordance with the following Reference Standards:
 - 1. Drywall Construction Guidelines promulgated by U.S. Gypsum within the 4th edition of the Gypsum Construction Handbook.
 - 2. ASTM C 754, Specifications for Installation of Steel Framing Members to Receive Screw Attached Gypsum Wallboard.
 - 3. ASTM C 840, Standard Specification for Application and Finishing of Gypsum Board.
 - 4. ASTM C 1178 Standard Specification for Glass Mat Water Resistant Gypsum Backing Panel.
 - 5. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
 - 6. ASTM E 90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
 - 7. Applicable publications of the Gypsum Association; 810 First Street NE; Washington, DC 20002.
 - 8. Balance of ASTM specifications governing gypsum construction, framing and fasteners as applicable to intended installation including C 36, C79, C 442, C 645, C 931, C 1002, C 1047 and, as recognized by governing agencies/code facilitators ASTM C 1396.
- B. Definitions: Gypsum Board Construction Technology: Refer to ASTM C 11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.
- C. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
- D. <u>Fire rated Construction Ratings</u>: Wherever fire resistance classifications (2 hour, 1 hour, and similar designations) are indicated on the Drawings, or required by local fire regulations and codes, for walls and partitions, provide materials, accessories, and use assemblies which have been listed by UL or tested in excess of requirements of ASTM E 119 for the type of construction shown and the governing building code and fire regulations, other requirements of these specifications notwithstanding.

1.5 SUBMITTALS – Coordinate with Section 013300

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 01330 and 013200, prepare and submit a fully developed submittal schedule; note review times set forth in Section 013300 are deemed "average", for large submissions allow longer review times.

- Attention is directed to Section 013114 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Certification of Specification Compliance on all materials.
- B. Product Data: Submit manufacturers' specifications for the following products: gypsum board, joint compound, acoustical sealant, insulation, metal studs and fasteners.
- C. Samples:
 - 1. Gypsum Board: 12 inches square, each type specified.
 - 2. Fasteners: 10, each type.
 - 3. Acoustical Sealant: 1 pint.
 - 4. Insulation: 12 inches square, each type specified.
 - 5. Studs, tracks, shoes, furring channels and accessories: 12 inch lengths, each type specified/required.
 - 6. Trim systems, including reveal shapes.
- D. Shop drawings and engineering calculations for any special areas of construction as determined by the Architect where same, in his opinion deviates from normal construction practice.
- E. Material Safety Data Sheet (MSDS) must be submitted for each product.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)

- A. Delivery and Handling
 - 1. Deliver materials to the project site with manufacturer's labels intact and legible.
 - 2. Handle materials with care to prevent damage.
 - 3. Deliver fire rated materials bearing testing agency label and required fire classification numbers.
- B. Storage
 - 1. Store materials inside under cover, stack flat, off floor.
 - 2. Stack wallboard so that long lengths are not over short lengths.
 - 3. Do not overload floor system.
 - 4. Store adhesives in dry area, provide protection against freezing at all times.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Temporary Climate control will be used to maintain dry bulb temperatures between 55 and 80 degrees F and relative humidity at less than 50% during installation, taping and curing of joint compound.
- B. Ventilation
 - 1. Provide ventilation during and following adhesives and joint treatment applications.
 - 2. Use temporary air circulators in enclosed areas lacking natural ventilation.
 - 3. Under slow drying conditions, allow additional drying time between coats of joint treatment.
 - 4. Protect installed materials from drafts during hot, dry weather.

- C. The moisture content of the taped and sanded gypsum board walls be measured and documented by the general contractor at two locations on each wall: the bottom edge and halfway between floor and ceiling. Specify that the interior finish may not be applied until the moisture content of the wallboard is below 0.4% on a gypsum moisture meter or below 12% on a wood meter.
- D. Protection: Protect adjacent surfaces against damage and stains.

1.8 SPECIAL MATERIAL AND CONSTRUCTION REQUIREMENTS

- A. All material used in areas scheduled and/or shown to receive ceramic tile shall be of fiberglass reinforced concrete panels (FRCP) or "special board" as noted in Part 2 herein. **GREEN board is precluded from use in this project**.
- B. All material applied to interior of exterior wall either on furring channels or free standing framing shall be "foil backed" type.
- C. Exterior soffit treatments shall be with "exterior" board and fiberglass tape and exterior compound.
- D. All ceiling work shall be with "ceiling board" and conventional finish unless otherwise noted on the finish schedules.
- E. Where gypsum finish is in contact with existing or new plaster, tape system shall be of the "fiberglass" type using compatible adhesive. Finish and application shall be as specified herein.
- F. Maintain fire and acoustical ratings as required by carrying assembly to structure above and safing off.
- G. Double all studs at openings, anchor from floor to structure above unless otherwise directed.
- H. Provide a deflection track system at top of all partitions carried to structure above. Where firestopping is required at rated partitions, employ combination deflection/fire stop track system or system known as FIRE BARRIER which has intumescent adhered to the track systems.
- I. Tolerances: Do not exceed 1/8 inch in 8 feet variation from plumb or level in any exposed line or surface, except at joints between planes or abutting edges or ends. Shim as required to comply with specified tolerances.
- J. Provide control joints in all partitions at 30 foot maximum spacing; at all ceilings at 30 foot maximum centers without perimeter relief (900 square foot increments); at all ceilings at 50 maximum centers with perimeter relief (2500 square foot increments) and where ceilings form "L", "U" or "T" shaped configuration. Where joints are placed in rated partitions, conform to UL assembly data for particular installation; double framing at all joints.

1.9 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.

- 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
- 9. Do not contain methylene-chloride.
- 10. Do not contain chlorinated hydrocarbons.
- 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

- 2.1 MATERIALS GENERAL
 - A. Basic gypsum wallboard materials for work in this section, unless otherwise specified, shall be as far as possible by one manufacturer. Materials specified by trade name or model number are those of the United States Gypsum Company, similar and equal products of the following will be acceptable.
 - G-P Gypsum (Dens-Glass Products)
 - National Gypsum
 - CertainTeed
 - LaFarge North America
 - Temple Inland

<u>NOTE</u>: Material shall be furnished with tapered edge for taping systems specified below and subject to criteria established in Part 1 above. It should be noted that no board will be permitted to be hung until a controlled environment is achieved for the work area(s) involved – i.e. fully weather protected and temperature/humidity controlled.

- 2.2 WALLBOARD SPECIFICS Gypsum Wallboard shall conform to ASTM C 1396 for conventional material and C 1629 for abuse resistant material and shall be in 4 foot widths by largest practical length and as follows:
 - A. Fire rated board with tapered edge: ASTM C 1396, 5/8 inch throughout project.
 - B. Humidity, mold and abuse resistant gypsum panels to have a non-combustible, moisture and mold resistant gypsum core encased in a mold and moisture-resistant, 100-percent recycled green, blue or purple face and brown back papers; 5/8 inch thickness, Type X.
 - 1. US Gypsum "SHEETROCK brand MOLD TOUGH AR" gypsum panels
 - 2. National Gypsum "Type XP/AR"
 - 3. G-P Gypsum "Dens-Armor Plus/AG"
 - 4. CertainTeed "ProRoc w/M2Tech"

Or equal having a noncombustible, moisture and mold-resistant gypsum core that is encased in moisture and mold-resistant, 100 percent recycled face and back cladding; panels shall be classified Type X.

- C. Ceramic tile backup at walls scheduled Glass mat designed gypsum panels or Fiberglass reinforced cement panels (FRCP):
 - 1. "Dens-Shield Tile Backer" by G-P Gypsum
 - 2. "GlasRoc Tile Backer" by CertainTeed
 - 3. "Util-A-Crete" by FinPan Inc.
 - 4. "Wonderboard/Glas-Crete" by Custom Building Products, Inc.
 - 5. "Durock" by U.S. Gypsum Co.
- D. Mold resistant gypsum shaft liner panels, 1 inch by 24 inches by full height T & G.
- E. Exterior ceiling board shall be specially formulated for this use, 1/2 inch minimum thickness, tapered edge design.

- F. Interior ceiling board shall be specially formulated for this use, 1/2 inch minimum thickness, tapered edge design. Evidence of compliance with NER 459 code compliance document required.
- 2.3 STEEL STUD FRAMING ASTM C 645
 - A. Stud and accessory systems shall be as manufactured by one of the following:
 - ClarkDietrich Building Systems.
 - 2. MarinoWare; a Division of Ware Industries
 - 3. SCAFCO Corporation
 - 4. The Steel Network

Or approved equal manufacturer.

- B. Gauge minimum 20 (0.0312) for all framing; NO LIGHTER MATERIAL SHALL BE USED. Acceptable alternatives are the "ProStud" assembly by ClarkDietrich or the "ViperStud" by MarinoWare each in 20 gauge equivalent as evidenced by the following.
 - ProStud20; 65 ksi. Minimum Thickness **0.0220 inches**; Minimum Design Thickness **0.0232 inches**.
 - Viper20; 57 ksi. 3-5/8 inches and down, minimum thickness 0.0195 inches; minimum design thickness 0.0206 inches. 4 inches and above, minimum thickness 0.0209 inches; minimum design thickness 0.0220 inches.

NOTE: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

Modify stud gauges at the following locations:

- 1. Steel studs behind toilet partitions 16 gauge (0.055) minimum.
- 2. Steel studs adjacent to door bucks either:
 - a. 16 gauge (0.055) minimum.
 - b. "Boxed" studs, 20 gauge (0.0312) minimum.
 - c. Patented system of jamb studs and header systems in gauges determined by span of opening and certified by engineering calculations equal to:
 - 1. "ProX Header System and Jamb Stud" by Brady Construction Innovations
 - 2. "Header Assembly and Jamb Stud" by Priceless Steel Products.
 - 3. "Red-Header Jamb and Header System" by ClarkDietrich Building Systems.
- 3. Track systems, gauge as for studs: Leg height, 1-1/4 inch throughout unless modified by details.
- C. Shaft wall framing: configurations as required for construction indicated consisting of galvanized steel C-H studs, J-Runners or other stud shapes specified on Drawings, 0.0312 inch minimum thickness of base metal or 20 gauge.
- D. For low wall and rail framing, assembly shall be constructed using 18 gauge studs with double end posts; U.S. Gypsum rail struts "SPT-119", the "Pony Wall" fabricated from 2 each 250S162 54 Mil steel studs welded face to face at 12 inches foot on center with a base plate of 3 gauge Galvanized Steel, Grade D, welded to the upright support in a minimum of 3 3/8" wide by 14" long with six 5/8

- inch holes spaced as shown or "NOFLEX" assembly (1-800-720-1994) at maximum 36 inch centers and securement attachments suitable for intended use.
- E. Deflection Track: "Slip Joint Design, SFT" as manufactured by Superior Metal Trim division of Delta Star, Inc. or approved equal furnished in gauge to match balance of partition framing.
- F. Combination Deflection Track/Fire Stop System: Assembly shall be similar and equal to "Fire Trak Deflection and Firestop System" complete with stud clips to permit vertical movement and to restrict horizontal movement each as manufactured by the Fire Trak Corporation. Track shall be furnished in gauge to match balance of partition framing and in such design as to permit the execution of required firestopping with combination of gypsum wallboards and "cavity fill" of mineral fiber wool insulation <u>all</u> accomplished as part of the work of this Section.

NOTES: Options for both 2.03.E and F:

- Clark/Dietrich Building Systems: Combination of TREF Deep Leg Track, (0.0312" Thick) and "Spazzer 9200 Bar" (0.0346" Thick).
- "Snap-Trak" system as manufactured by Total Steel Solutions (1-877-294-7958).
- Preassembled track system known as "BLAZE FLAME" incorporating standard track systems.
- G. All material shall be electro galvanized steel in locations and sizes as indicated or required by "limiting height" criteria.
- 2.4 FURRING CHANNELS: #25 gauge electro galvanized steel, U.S.G., Drywall Furring Channels, and/or RC1 as required installation.

2.5 ACCESSORIES

- A. Corner Beads General: #25 gauge, perforated, galvanized steel, U.S.G. Dur-A-Bead (#103), flange width as recommended by the manufacturer for each thickness of wallboard. Corner beads to be installed at all outside corners of gypsum.
- B. Casing Beads: U.S.G. No. 400 Series or similar, as required where gypsum board abuts other materials unless noted otherwise.
- C. Control Joints: U.S.G. No. 093 or similar.
- D. Adhesive: recommended by the approved gypsum wallboard manufacturer for each particular installation.
- E. Strapping 20 gauge by 12 inch galvanized sheet steel or patented assembly known as "Danback® Flexible Wood Backing Plate" as distributed by Dietrich.
- F. Prefabricated Header System: ProX Header and related accessories all as manufactured by Brady Construction Innovations (1-888-475-7875). www.ProXHeader.com>

2.6 FASTENERS

- A. Screws for fastening conventional gypsum board systems: Corrosion resistant U.S.G. Drywall Screws, minimum 1-5/8 inch, Type S Flat Phillips, Hex or Pan Head, self drilling screws or as recommended by the accessory manufacturer for the specific condition and thickness of materials being joined.
- B. Anchor Bolts and Studs: ASTM A 307, Grade A, carbon steel, with hex-head carbon steel nuts and flat steel washers. **Hot-dip zinc coated in accordance with**

- **ASTM A 153.** Provide bolt or stud type and size as required by structural design calculations required by 1.05 above.
- C. Expansion Anchors: Federal Specification FF-S-325, Group II, Type 4, Class 1. Provide bolts listed or approved by one or more of the following and of diameter and length as required by structural design calculations required by 1.05 above.
 - 1. Underwriters Laboratory.
 - 2. Warnock Hersey (ITS).
 - 3. International Conference of Building Officials.
- D. Powder Actuated Fasteners: Federal Specification FF-P-395b. Manufacturer from AISI 1062 or 1065 steel, austempered to a minimum core hardness of 50 to 54 HRC and zinc plated in accordance with ASTM B 633. Provide fasteners listed or approved by one or more of the following and of type, diameter and length as appropriate for installation and construction type.:
 - 1. Underwriters Laboratory.
 - 2. Warnock Hersey (ITS).
 - 3. International Conference of Building Officials.
- 2.7 GASKETS: Polyvinylchloride (PVC) closed cell foam, approximately 3/8 inch by 3/8 inch, buff or white, with pressure sensitive adhesive one side.
- 2.8 JOINT FINISHING SYSTEM:
 - A. Perforated reinforcing joint tape Similar and equal to "Perf-A-Tape" by U.S. Gypsum.
 - B. Joint Compound Regular Gypsum Installations: Similar and equal to U.S. Gypsum "Durabond" and/or "Ready-Mixed Joint Compound-All Purpose" ready mixed joint compound in formulation as determined by the manufacturer as suitable for intended use.
 - <u>NOTE</u>: See Part 1 herein for restrictive measures to be taken for preparation, application and curing of compound systems; further Toxicity/IEQ Lime compound. All purpose joint and texturing compound containing inert fillers and natural binders. Pre-mixed compounds shall be free of antifreeze, vinyl adhesives, preservatives, biocides and other slow releasing compounds.
 - C. Joint Compound "Special" Board Installations: "Durabond" setting type compound only.
 - D. Glass fiber pressure sensitive tape system for use with glass mat and/or fiber reinforced cement board at ceramic tile and other hard surfaced areas.
 - 1. Fiber reinforced cement board at ceramic tile or other hard surfaced areas.
 - 2. Joints in "exterior soffit" systems scheduled to receive special coating finish shall be treated with uncoated fiberglass tape set into and finished with "chemical curing" waterproof compound and finished as for "Level 3".
- 2.9 CAULKING/SEALING: Type V for general work, Type VII for fire caulking requirements, 2.10 reference Section 07 90 00.
 - A. Acoustical Sealant: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

NOTE: Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

- 1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
 - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
- Acoustical Sealant for Concealed Joints:
 - a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
 - b. Pecora Corp.; BA-98.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.

2.10 INSULATION

- A. Sound attenuation batt type thickness and locations shown on drawings shall be of glass fiber formulation, unfaced design and designed for friction fitting within stud cavity. Material shall be class "A" as per ASTM E 84 requirements.
- B. Material binders shall be a rapidly renewable organic product and overall product shall have a minimum 35 percent recycled content, classified as post-consumer and shall be free from urea-formaldehyde resins.
- C. Fully seal and tape joints when accessible, fully butt all others to insure sound tight joint.
- D. Material shall be one of the following:
 - 1. "Sound Control" by Johns Manville
 - 2. "Sound Attenuation Batts" by Owens Corning.
 - 3. "CertaSound" by CertainTeed.

OPTION: Mineral fiber blankets similar and equal to U.S.Gypsum "Thermafiber SAFB" in 2.5 pound density.

2.11 CEILING SUSPENSION SYSTEM

- A. Hangers
 - 1. Interior general use, 11 gauge wire hung
 - 2. Exterior Soffits and interior areas subjected to uplift pressures and/or "rigid" suspended, 1/4 inch threaded rods supporting "tee" grid system.
- B. Grid System Classification is "Heavy Duty" similar and equal to:
 - 1. Chicago Metallic "System 640";
 - USG "Drywall Suspension System";
 - 3. Armstrong "Drywall Grid, XL Design"; or approved equal.

NOTES:

- GRID SHALL BE HOT-DIPPED GALVANIZED FOR ALL LOCATIONS.
- Grid shall be sway braced to comply with seismic requirements of the building codes.

2.12 DECK FILLERS

A. Closed cell neoprene in shape to fit steel deck by 1 inch thickness conforming to ASTM D 1056-68 and MIL-R6130B, Type 2, A or B "Soft", self extinguishing.

OPTION - Mineral wool firesafing as specified under Section 07 84 00.

2.13 Balance of materials required for the work shall be as specified elsewhere in this Section.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 INSTALLATION - PARTITION FRAMING

- A. At all partition floor and ceiling tracks and wherever drywall partitions abut vertical masonry or concrete surfaces, provide gaskets and/or caulking/sealing.
- B. When double layer, face caulk on base layer top, bottom and edges.
- C. Provide drywall furring channels on walls and partitions where indicated. Secure channels to masonry or concrete at 16 inches o.c. with suitable fasteners at maximum of 24 inches o.c.
- D. Framed partitions shall be constructed with steel studs and channels true to line and fastened to construction top and bottom at 24 inches o.c. Studs shall be twist locked into tracks at 16 inches o.c. Where shown, detailed, or required by applicable codes, partitions shall be carried to the base structure above and fastened.

<u>NOTE</u>: Attention is directed to Part 1 of this section for requirements for head deflection tracks and/or combination deflection track/fire stop systems at all locations where partitions are carried to base structure above in regular and/or rated configurations.

Double studs to structures at <u>all</u> openings. Place steel studs approximately 2 inches from abutting partitions and 2 inches from each side of interior angle of all corners. Secure steel studs to top tracks with galvanized steel adjustable stud shoes or within "flex track" or by use of double insert head track.

- E. Stud Tracks Standard 1-1/4 inch drywall floor and ceiling stud tracks securely fastened to beams, slabs or partitions with 1/2 inch stud bolts or other method approved by manufacturer spaced not more than 24 inches on centers. Gauge of steel, minimum 20 (0.0312) or as indicated on Drawings.
- F. Horizontal Bracing 3/4 inch steel furring channels fastened to inside of stud with webs in a horizontal position. Spacing of channels shall not exceed 6 feet.
- G. Shaft type partitions shall be erected in strict accordance with the manufacturer's directions.
- H. All free standing furring and/or solid partition shall be aligned accurately according to the partition layout and constructed as for D. above.
- 3.3 BOARD APPLICATION General application shall be as for gypsum board following requirements set forth in basic specification and as supplemented by ASTM C 840 specifications for Application and Finishing of Gypsum Wallboard.
 - A. Cut wallboard by scoring and breaking or by sawing, working from the face side. Where board meets projecting surfaces, it shall be neatly scribed.
 - B. Apply wallboard first to ceiling then to walls at right angles to framing members.
 - C. Use board of maximum and practical length so an absolute minimum number of

- end joints occur.
- D. Regular gypsum wallboard shall be brought into contact with each other but shall not be forced into place.
- E. Locate wallboard joints at openings so that no end joints will align with edges of openings. Stagger end joints. Joints on opposite sides of partitions shall not occur on the same stud.
- F. Center abutting ends or edges over the stud flanges. Where wallboard abutments are made between studs, free ends are to be back blocked. No two such joints should occur between the same two studs.
- G. Locate all attaching screws 12 inches o.c. Attach all wallboard to studs with screws as specified.
- H. Laminated Gypsum Installations
 - 1. Finish layer of gypsum board shall be vertical in all cases.
 - 2. All joints of standard gypsum board second layer shall fall at least 10 inches from parallel joints in base layer.
 - 3. Prebow finish layer of gypsum board by storing overnight in such position that ends of each panel curve away from the base layer when put in vertical mounting position.
 - 4. Spread laminating adhesive over the entire back surface of the cut to size finish layer of wallboard with a notched spreader that leaves ridges 1/4 inch by 1/4 inch spaced 1/4 inch o.c.
 - 5. Position finish layer on the wall and hold in place with sufficient temporary bracing to insure adequate contact between the layers. When the bond is developed (approximately 24 hours) the temporary bracing shall be removed.
 - 6. Finish layer of standard gypsum board may be secured with temporary screws where bracing is not practicable. Remove screws and fill voids solid, finish as specified for joint and corner finishing.

3.4 CORNER AND TRIM TREATMENT

- A. Internal Corners Treat as specified for joints, except that the reinforcing tape shall be folded lengthwise through the middle and fitted neatly into the corner.
- B. External Corners
 - Install a corner bead fitting neatly over the corner and secured with the same type fasteners used for applying the wallboard, spacing the fasteners approximately 6 inch on centers and driving through the wallboard into the framing and furring member.
 - 2. After the corner piece has been secured into position, treat the corner with joint compound and reinforcing tape as specified for joints.
- C. Where ceiling "reveal" trim details are used at intersection of gypsum board and companion ceiling systems, same shall be set **by means of a laser "Line of Light" system** only to insure a true and level plane.
- D. The drawings do not purport to show all locations and all requirements for metal trim in connection with the work of this Section. Carefully study the Drawings and the installation; provide in place all metal trim normally recommended by the manufacturer of the gypsum wallboard used in strict accordance with the manufacturer's recommended methods of installation.

3.5 GYPSUM WALLBOARD FINISHING

A. The following specification defines the level of finishing of gypsum board surfaces

as defined in ASTM C 840, Article 22 and as amended by GA 214-90.

Level "1" - All joints and interior angles shall have tape embedded in joint compound; surface shall be free of excess joint compound; tool marks and ridges are acceptable.

<u>LOCATIONS</u> - Fire and smoke taped baffles above suspended ceilings and elsewhere concealed from public view.

<u>Level "2"</u> - All joints and interior angles shall have tape embedded in joint compound and shall receive 1 separate coat of joint compound applied over all joints, angles, fastener heads and accessories; surface shall be free of excess joint compound; tool marks and ridges are acceptable.

<u>LOCATIONS</u> - Substrates to receive tile and/or paneling in excess of 1/4 inch thickness.

<u>Level "3"</u> - All joints and interior angles shall have tape embedded in joint compound and shall receive 2 separate coats of joint compound applied over all joints, angles, fastener heads and accessories; surface shall be free of excess joint compound; all surfaces shall be <u>smooth</u> and free of tool marks and ridges.

<u>LOCATIONS</u> - Areas scheduled to receive heavy texture finishes, hand or spray applied, paneling less than 1/4 inch thickness <u>or</u> Class III vinyl wall coverings.

<u>Level "4"</u> - All joints and interior angles shall have tape embedded in joint compound and shall receive separate coats of joint compound applied over all joints, angles, fastener heads and accessories; surface shall be free of excess joint compound; all surfaces shall be <u>smooth</u> and free of tool marks and ridges.

<u>LOCATIONS</u> - Areas scheduled to receive paint coatings; paneling less than 1/4 inch thickness <u>or</u> vinyl or fabric wall coverings.

B. Allow each application of compound applied to joints and fasteners to dry, then sand if necessary.

Caution shall be used to avoid roughing of wallboard paper.

3.6 DRYWALL CEILINGS AND SOFFITS

- A. Framed drywall ceilings and soffits shall have 20 gauge metal stud channels, 16 inches o.c., secured where possible directly to construction above, with suitable fasteners at a maximum of 24 inches o.c. Where greater spacing of fasteners is required, and where ceiling or soffit is to be suspended provide carrying channels suspended on 1/4 inch rod hangers. Lap channel ends 8 inches and wire tie together 1-1/2 inches from end of channel.
- B. Direct hung drywall ceilings and soffits shall be installed thru use of a direct hung suspension system employing a tee grid system as specified in Part 2 above.
- C. System shall be wire hung for interior use and rod or strap hung for exterior use and wherever subjected to wind pressures, uplift.
- D. Provide all accessory items including edge trim angles, exposed for exterior

- applications and concealed for attachment and taping for all interior applications. See Paragraph 3.04 herein for "**Laser**" setting of joints between walls and ceilings if reveal system is required by details.
- E. Secure single or double layer of gypsum wallboard to furring channels and tape and spackle with products as per Part 2 in accordance with Paragraph 3.02 above.

3.7 FIBERGLASS REINFORCED CEMENT (FRCP) PANEL INSTALLATION

- A. Install the "FRCP" board at right angle to the framing. Install the "FRCP" board with the separate boards in moderate contact but not forced into place. Stagger the boards so that the corners of any four boards will not meet a common point except in vertical corners.
- B. Fasten boards to steel framing with 1-1/4 inch screws spaced 6 inches o.c. space fasteners at least 3/8 inch from edge of board. Edges or ends parallel to framing shall be continuously supported. Where two panels abut on a stud, insert the screw in the joint between the panels together with the specified washer to securely catch the edge of both panels.
- C. Taping Apply 2 inch fiberglass tape over joints and corners; embed firmly with adhesive.
- 3.8 FIELD QUALITY CONTROL: Prior to any board installations, Architect or designee will conduct an above-ceiling observation to ensure compliance with UL criteria for all full-height fire-rated partitions, and report deficiencies observed. Do not proceed with installation of gypsum board until deficiencies have been corrected.

3.9 PARTITION IDENTIFICATION

- A. Place identification on all partitions indicated on Drawings as having a required fire or smoke rating, or lead lining.
- B. Identification shall be as follows:
 - 1. Type: Same as indicated on drawing legend.
 - 2. Location: 10 feet on center, both sides of partitions, above ceiling lines.
 - 3. Place above access panels in hard ceilings.
 - 4. Style of Lettering: 2 inches high, helvetica style, painted with aid of stencils.
 - 5. Color: Red.

3.10 PROTECTION AND CLEANING

- A. Protect, by suitable means, all work of this section until responsibility for same shall have been relieved by next operation.
- B. This Contractor shall sweep all his debris and remove same as work progresses.

3.11 WASTE MANAGEMENT – Coordinate with Section 01 74 19

- A. Separate clean waste gypsum products from contaminants for recycling in accordance with the Waste Management Plan. Do not include wood, plastic, metal, asphalt-impregnated gypsum board, or any gypsum board coated with glass fiber, vinyl, decorative paper, paint, or other finish. Place in designated area and protect from moisture and contamination.
- B. Recycle clean waste gypsum products:
 - 1. Return to gypsum board manufacturer.

- 2. Pulverize and apply on-site as soil amendment in accordance with landscape specifications. Do not use products containing glass fiber. Protect granular material from moisture.
- C. Separate metal waste in accordance with the Waste Management Plan and place in designated areas for recycling or reuse.

End of Section

SECTION 093000 - TILE WORK

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of the <u>tile work</u> for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - Provide tile floors, bases and walls as indicated on the drawings and/or scheduled. Tile work includes - ceramic, quarry, paver and such other material scheduled.
 - 2. Provide over prepared subfloors in all areas suspended above grade and scheduled to receive tile floors a trowel on liquid membrane waterproofing system and where large format tile (porcelain material) is used, a continuous "crack isolation membrane" shall be provided. Turn membrane systems up at all vertical intersections 4 inches to provide a "bathtub" containment with fillet and liquid system. Tie membrane to floor drains.
 - 3. Provide saddles at all tile/dissimilar material floor changes.
 - 4. Provide "prefabricated/preengineered" expansion/control joint systems; transition conditions and the like as shown on the drawings.

NOTES:

- Installations of floors and base, including trim shall be in accordance with finish schedules, drawings, enlarged details and the like.
- Provide applied surfacing to insure pitch to drains using material and approach approved by the Architect and compatible with specified setting methods.
- Furring around vertical pipes, conduits and ducts, and columns in rooms or spaces having tile base or wall finish shall be faced with tile as scheduled or specified for room base and walls.
- Coordinate with Section 09 29 00 for backup system for wall cladding, i.e. –
 FRCB or Dens-Shield at option of contractor.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. 03 30 00 Concrete
 - B. 04 20 00 Masonry
 - C. 06 10 00 and 06 20 00 Carpentry
 - D. 09 20 00 Gypsum Drywall
 - E. 09 90 00 Painting
 - F. 10 21 00 Toilet Compartments
 - G. 10 26 00 Corner Guards
 - H. 10 28 00 Toilet Accessories
 - Division 22 Plumbing

1.4 QUALITY ASSURANCE

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- A. All tile shall be standard grade and meet the requirements of ANSI A137.1, latest edition thereof, and further, All floor and ramp surfaces shall be certified to have minimum slip resistance characteristics of 0.6 for floors and 0.8 for ramps as promulgated by the 2010 ADA requirements.
- B. Prepare floors, walls and base substrates for application of finish and install same in accordance with Tile Council of North America recommendations and requirements governing said systems as listed in Part 3 of this Section.
- C. Installer is to be a firm who has a minimum of five years experience with the installation of specified materials.

1.5 SUBMITTALS – Coordinate with Section 01 33 00

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Submit manufacturers' specifications and installation instructions for the following:
 - 1. Each type of tile and trim units specified.
 - 2. Waterproofing and setting materials specified.
 - 3. Grouting materials specified.
 - 4. Saddle type specified.
 - 5. Other items being incorporated in the work.
- B. Shop Drawings Submit Drawings indicating tile patterns and locations and width of control and expansion joints in tile surface when required by Architect.
- C. Samples
 - 1. Initial Selection: Submit manufacturer's color charts consisting of actual tiles or sections of tile showing full range of colors, textures, and patterns available for each type of tile indicated. Include grout manufacturers standard range of colors for each grout type required.
 - 2. Verification Samples:
 - Samples of each type and color specified, 12 inch by 12 inch sample with tile mounted on plywood or hardboard panels and grouted.
 - b. 12 inch long sample of marble saddle, leveled and finished.
 - c. Trim units: 2, each type and shape specified.
- D. Master Grade Certificate
 - 1. Before setting any tiles, furnish to the Architect a certificate of grade, etc.,

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- properly filled in on a Master Grade Certificate of the form recommended by the Department of Commerce.
- Certificate shall be signed by the manufacturer of the tiles and by the subcontractor for the Work, stating the grade, kind and full quantities of tiles; and give identification marks for all packages of tiles furnished under this Contract.
- 3. Brand packages with corresponding shipping marks.
- E. Certification of Specification Compliance.
- F. Material Safety Data Sheet (MSDS) must be submitted for each product.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)

- A. Delivery and Storage
 - 1. All materials shall be delivered to the job site in unopened factory sealed containers clearly labeled as to product manufacturer, color and/or other pertinent characteristics.
 - 2. Store all materials under cover in a manner to prevent damage and contamination; store only the specified materials at the job site.
- B. Protection Use all means necessary to protect ceramic tile materials before, during, and after installation and to protect the installed Work and materials of all other trades.
- C. Replacements In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions and protect Work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- B. Maintain temperatures at not less than 50 degrees F (10 degrees C) in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

1.8 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

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2.1 GENERAL – See material schedule for types and nominated manufacturers, further, the Contract Documents are intended to produce a building of consistent character and quality of design. All components of the building have been selected to have a coordinated design in relation to the overall appearance of the building. The Architect shall judge the design and appearance of proposed substitutes on the basis of their suitability in relation to the overall design of the project, as well as for their intrinsic merits. The Architect will not approve as equal to materials specified proposed substitutes which, in his reasonable opinion, would be out of character or quality of design of the project. Note: Toilet room wall tile is special order and proper lead time must be considered. Colors are critical.

Floors

Ceramic Tile Toilet Royal Mosa, Mosa Core Collection.

Terra Cool Grey #238V.12" x 24" Rooms

Walls

4'h Typical Porcelain Tile Corridors Royal Mosa, Mosa Core Collection,

> Base-Anthracite 216V Format :15 x 60 cm Top Cap- Anthracite 216V . Format :5 x 60cm Field One-Mid- Grey 206V. Format: 30 x 60 cm Field Two - Chalk White 4101V, Format 30 x60cm

Accent row- Blue 239V Format: 10 x 60 cm

Top edge -Schluter edge, typ.

Accent Tile At Drinking Daltile Eclettica Ceramic Wall tile Deco. Caricoa

fountain White M1AP, Format 15" x48"

Ceramic Tile Toilet rooms Ceramica Vogue, Interni Satin,

Field: Ghiaccio RAL 9003 10 x 20 cm Accent (Color 3): Mandarino RAL 1034

Accent Bands (Color 2) Daltile Natural Hues 2" x 8" color Atlantis QH43

Grade 2 or similar color by Ceramica Voque

Base: (Color 1)-Cod.1 98.2mmx 198.4 mm Color: Ferro RAL8019. Ceramic Tile

Single

Toilets Ceramica Vogue, Interni Satin,

Field: Ghiaccio RAL 9003 10 x 20 cm with Bullnose top tile.

Base - # Cod.1 98.2mmx 198.4 mm Color: Ferro RAL8019. Include all

accessories pieces for a complete installation.

2.2 MEMBRANE WATERPROOFING

- Trowel applied membrane waterproofing shall be a single component elastomeric Α. and seamless membrane system similar and equal to -
 - "Elastiment 344 Waterproof Membrane" as manufactured by Boiardi 1. Products Corporation:
 - "Hydroment Ultra-Set" or "Gold" as manufactured by Bostik; 2.
 - "Mapelastic HPG" by Mapei; 3.
 - "Watertight" by Laticrete;

each as conforming to ASTM C 836 and ANSI A136.1.

Sheet membrane waterproofing (incorporating crack isolation properties) shall be B. similar and equal to "NobleSeal TS" by the Noble Company and shall be manufactured of non-plasticized Chlorinated Polyethylene (CPE), nominal thickness of 30 mils, flexible synthetic elastomer with fabric laminated on both

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surfaces. Material shall conform to Thin-Bed waterproof membrane standard ANSI A118.10. Equal products shall formulated to meet "Heavy Duty Service requirements per ASTM C 627".

C. REDGARD WATERPROOFING AND ANTI-FRACTURE MEMBRANE conforming to the following properties:

Pot Life	Indefinite	
Initial Set, ASTM C 191 @ 70□□F (21□□C)	1 1/2 - 2 hours	
Drying time before floor covering installation	24 hours	
ANSI 118.10 Sect #		
Fungus and Micro-Organism Resistance (4.2)	Passes	
Seam Strength (4.2)	16 lbs./2 inch width (>7.3	
	kg/5 cm)	
Breaking Strength (4.3)	484 psi (34.0 kg/cm2)	
Dimensional Stability (4.4)	0.05%	
Waterproofness (4.5)	Passes	
Shear Strength 12-day dry cure (5.6)	267 psi (18.8 kg/cm2)	
100-day water immersion (5.7)	89 psi (6.3 kg/cm2)	
% Elongation ASTM D 638		
21-day dry cure	562 psi (39.5 kg/cm2)	
7-day dry cure / 21-day wet cure	657 psi (46.2 kg/cm2)	
IAPMO/Uniform Plumbing Code 4244		
Hydrostatic pressure & alkali resistance	Passes	
Waterproofness	Passes	
FHA 4900-1-615-5, Sections C & D	Compliant	

2.3 SETTING MATERIALS

- A. Floors and Bases
 - 1. Dryset Mortar, ANSI A118.1 floors other than those over liquid membrane.
 - 2. Combination membrane bond coat and latex modified thin set mortar over liquid membrane material as above. Membrane bond coat to consist of
 - a. Portland Cement ASTM C 150 Type 1
 - b. Sand ASTM C 144
 - c. Acrylic latex admixture similar and equal to Bostik "Hydroment Multipurpose Acrylic Latex Additive #425" or Mapei "Plastijoints Acrylic Latex Additive".

Bond Coat Proportions - 1:2-1/2:Acrylic Latex in quantity required to achieve a workable consistency. **NO WATER PERMITTED**. Thin set mortar - fast setting, latex modified, flexible system similar and equal to Bostik "Hydroment Single-Flex F.S. Mortar #973" mixed with "#425 Latex" or Mapei "Keralastic".

- B. Walls: Dry-Set (ANSI A118.1) or Latex Portland Cement (ANSI A118.4) Mortar
- C. Saddles Dryset mortar, ANSI A118.1
- D. Setting methods for patching, matching and extending existing tile areas with new material shall match present setting methods.

2.4 GROUTING MATERIALS

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- A. Water-Cleanable Epoxy Grout: ANSI A118.3
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Custom Building Products: 100% Solids Epoxy Grout
 - b. Laticrete International, Inc.; SpectraLOCK Pro Grout
 - c. MAPEI Corporation; Kerapoxy IEG 100% Solids Epoxy Mortar and Grout
 - d. Merkrete Inc.; Merkrete ProEpoxy 100% Solids Epoxy Mortar and Grout
- B. Grout Colors: As selected by Architect from manufacturer's full range.
- 2.5 CRACK SUPPRESSION MEMBRANE To be used at all control joints, shrinkage cracks in substrates and like conditions.
 - A. Materials shall be a composite sheet membrane manufactured from chlorinated polyethylene (CPE), laminated to non-woven fabric on both sides, nominal thickness 0.030 inches and shall be similar and equal to:
 - 1. "NobelSeal CIS" crack isolation sheet as manufactured by the Nobel Company.
 - 2. "ECB Anti-Fracture Crack Repression Membrane" as manufactured by National Applied Construction Products.

System shall be furnished with primers and adhesives as standard with the nominated manufacturers.

- 2.6 CUSTOM FABRICATED METAL EDGE STRIPS/CONTROL JOINTS/EXPANSION JOINTS, ETC.
 - A. Edge/divider strips shall be prefabricated from stainless steel to be used as conditions required for use where tile adjoins adjacent floor finishes be it carpet, resilient or concrete.
 - B. Size accessories as required and/or as shown on the drawings.
 - C. Coordinate type and location where used with the Architect.
 - D. Material shall be as manufactured by Schluter Systems and shall consist of the following items and the intended locations.
 - 1. SCHIENE-E/V2A or RENO_EUGB-E/V2A for general use where tile flooring finish abuts carpet finish.
 - 2. DILEX-EDP for all expansion/control joints in porcelain tile flooring.
 - 3. Rondec for top and outside corner of wall tiles. Finish: Brushed stainless steel. Include caps and accessory pieces as required for a complete installation.
 - E. Coordinate type and location where used with the Architect.
- 2.7 Balance of materials required for the work shall be as specified elsewhere in this Section.

PART 3 - EXECUTION

- 3.1 INSPECTION AND ACCEPTANCE
 - A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.
 - B. Verify that substrate will allow floor tile to slope to drains.

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- C. Before proceeding with any tile work, make sure that all waterproofing, sleeves and flashings for pipe have been installed and that piping systems have been run and tested.
- D. Prepare and clean substrate in accordance with installation standards and manufacturer's instructions, and as follows:
 - 1. Remove protrusions, bumps and ridges by grinding or chipping.
 - 2. Repair, fill, and level cracks, holes, depressions and rough or chipped areas in substrate using patching material recommended by setting materials manufacturer.
 - 3. Concrete slab to have light broom finish when tile is installed by the thin-set method.
 - 4. Ensure that the substrate is within the following tolerances:
 - Horizontal surfaces (floors) Maximum variation in substrate shall not exceed 1/4 inch in 10 feet from required plane, depending on substrate.
 - b. Vertical surfaces (walls) Maximum variation in substrate shall not exceed 1/4 inch in 10 feet from the required plane, depending on substrate.
- E. Jobsite Blending: Blend tiles before installing in accordance with reference standards to produce an even range and distribution of color and finish.

3.2 INSTALLATION - TILE WORK

- A. Comply with appropriate ANSI A108 specifications and current Tile Council of North America Handbook for appropriate method of installation for each specification.
 - <u>NOTE</u> Where tile systems are set over waterproof membrane, system shall consist of membrane, membrane bond coat and tile setting mortar of composition selected. Time sequence is deemed critical for proper curing and is established by the nominated manufacturer of the setting materials.
- B. Obtain as near 100% coverage as possible of mortar to tile. Mortar coverage shall be no less than 85% and shall be sufficiently distributed to give full support under all corners and edges of the tile. Note: 95-100% coverage is mandatory. Periodically, remove sheets or individual tiles to assure proper bond coverage consistent with industry specifications.
- C. Ensure there is a minimum 1/8 inch of mortar between tile and substrate after proper bedding. Installer must periodically remove sheets or individual tiles to assure proper bond coverage consistent with industry specifications. If coverage is found to be insufficient, use a larger size notch trowel.
- D. Follow exactly grout manufacturer's instructions and comply with appropriate ANSI A108 specification depending on type of grout selected. Grouting is not complete until all grout haze and residues are removed from the surface of the tile.
- E. Saddles TH 611
- F. Joints EJ 171, sealant Type II and/or prefabricated system by Schluter in locations as scheduled.
 - a. Large format tile, same as grout joint, but not less than 1/4 inch.
 - b. Ceramic mosaic tile and glazed wall tile, never less than 1/8 inch, maximum 1/4 inch.
 - c. Spacing, unless otherwise defined 8 feet to 12 feet in each direction.

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- d. Provide joints where tilework abuts restraining surfaces such as perimeter walls, dissimilar floors, curbs, columns, pipes, ceilings, and where changes occur in backing materials and at all expansion and control joints in building structure.
- G. Intersections and returns shall be accurately formed. Cutting and drilling of tile shall be neatly done without marring the surface. The cut edges of tile against trim, finish or built-in items shall be carefully ground and jointed. Tile shall fit closely around electrical outlets, piping, fixtures and fittings, so that plates, collars or coverings shall overlap the tile. Recesses of proper size for built-in accessories shall be provided. Only sufficient clearance shall be allowed for leveling and plumbing to permit the metal trim to overlap the tile.

H. Joints

- 1. Align all wall joints to give straight uniform grout lines, plumb and level.
- 2. Align all floor joints to give straight uniform grout lines, parallel with walls.
- 3. Make joints between tile sheets same width as joints within sheets so extent of each sheet is not apparent in finish work.
- 4. Joints shall be grouted full and flush for square edge tile and to depth of cushion and concave for cushion edge tile.
- I. Order of setting tile shall be first, base; second, walls; third, floors.
- J. Provide all trimmers as necessary for a complete installation. Shapes shall be integral with wall tile (combinations) unless otherwise shown or noted. Tile plinths shall be provided where trim is shown for door openings in connection with tile base or wall finish. Wall finish shall extend into reveals of openings and shall be overlapped by trim, unless otherwise shown.
- K. All tile shall have standard combinations at external and internal corners and at intersections with wall and floor finish.

3.3 GROUTING

- A. Floors shall not be grouted before 72 hours after setting; walls before 24 hours. Before grouting, tile work shall be wet with clean water.
- B. Follow grout manufacturer's recommendation as to grouting procedures and precautions.
- C. Remove all grout haze, observing both tile and grout manufacturer's recommendations as to use of acid and chemical cleaners.
- D. Rinse tile work thoroughly with clean water before and after chemical cleaners.
- E. Polish surface of tilework with soft cloth.
- F. Where colored joints are required, non-fading mineral oxides shall be mixed with white Portland cement to obtain desired color or an approved pre-mixed colored cement may be used.

3.4 PROTECTION AND CLEANING

- A. Promptly remove all setting compound, grout and stains from face of all tile and adjoining surfaces.
- B. All tiles which are cracked, broken, chipped or otherwise damaged, shall be promptly removed and replaced.
- C. As soon as the tile work in each space has been grouted and cleaned, it shall be covered with either reinforced Kraft paper (Sisalkraft) or non-staining sawdust. Each of such spaces shall be closed to all traffic or work by approved barriers which shall be maintained until tiles are firmly set. Floor covering shall be kept and maintained until completion of the work of all trades or as otherwise directed by the

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- Architect, when it shall be removed without damage to tile or adjoining work.
- D. For final acceptance of the project, leave all tile work clean, whole and in perfect condition.
- 3.5 WASTE MANAGEMENT Coordinate with Section 01 74 19
 - A. Separate waste in accordance with the Waste Management Plan and place in designated areas in the following categories for recycling:
 - 1. Half tiles and larger: Set aside for reuse by Owner or nonprofit organizations such as Habitat for Humanity
 - 2. Broken tile, cutoffs smaller than 1/2 tile, and excess mortar and grout: Crush for use as mosaic, sub-base, or fill
 - 3. Separate metal waste and place in designated areas for recycling or reuse.
 - 4. Separate cardboard waste and place in designated areas for recycling.

End of Section

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SECTION 095100 - ACOUSTICAL TREATMENT

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of acoustical ceiling treatment for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - Provide, in accordance with finish schedules, details and the like acoustical ceiling systems using suspension systems suitable for specified acoustical materials.

NOTE: THIS CONTRACTOR IS RESPONSIBLE FOR THE PREPARATION OF A COMPLETE SET OF REFLECTED CEILING DRAWINGS SHOWING LIGHTING, AIR OUTLETS, GRID SYSTEMS, ACCESS POINTS AND THE LIKE. NO WORK WILL BE ALLOWED UNTIL APPROVAL OF SAME HAS BEEN RECEIVED FROM THE ARCHITECT. COORDINATE ALL REQUIRED INFORMATION WITH RESPECTIVE TRADE CONTRACTORS.

Coordinate with Section 01 31 14.

- 2. All basic ceiling hanger systems shall comply with the requirements of the local governing codes; grid systems shall be "seismic" resistant to applicable zone rating as set forth in the governing building code.
- 3. Ceilings shall be complete with all stops, reveal edges, trim systems and the like necessary and/or required to make the work complete. Provide custom molding trim systems at junctures of acoustical treatment and gypsum board fascias; coordinate with Section 09 29 00.
- 4. Perform balance of acoustical treatments as required to complete the work of this project.
- 5. Provide acoustic tile sizes of 2'x2' and 1'x2' where shown. Perimeter tiles shall be cut and installed as required so that no tile smaller than 6" in either direction is used throughout.
- 6. Provide custom molding trim systems at junctures of acoustical treatment and gypsum board fascias; coordinate with Section 09 29 00.
- 7. Provide open cell ceiling system at Multipurpose Room.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. Sound attenuation in partition construction
 - B. Division 23 Mechanical equipment sound isolation

1.4 QUALITY ASSURANCE

- A. The work of this Section shall be accomplished by a "Specialty Contractor" with mechanics skilled in the trade.
- B. Before starting any work under this Section, all surfaces and attachments to

- receive acoustical treatment and related suspension systems shall be inspected as per Part 3, Paragraph 3.01.
- C. Prior to installation ascertain that the building is sufficiently weathertight to prevent damage to the work. Roofing and roof flashings shall have been completed and roof found to be watertight. All exterior openings shall have been glazed or otherwise weather protected.
- D. All work of a nature conducive to high humidity conditions shall have been completed and be thoroughly dry. This contractor shall be held responsible for the cost of replacing all work of this Section damaged due to his failure to take the above precautions.
- E. Maintain uniform temperature of not less than 55 degrees F (13 degrees C) in rooms and spaces scheduled and/or required to receive acoustical treatment, before, during and after installation.
- F. Fit all units neatly around electrical fixtures, outlets, ducts, pipes and other work penetrating ceilings and/or soffits, and neatly scribe to abutting surfaces.
- G. Reference Standards
 - Underwriters Laboratories, Inc. Fire Resistive Directory as applicable for intended use.
 - 2. Acoustical and Insulating Materials Association "Job Conditions" manual.
- H. Fire Hazard Classification: ASTM testing for tile acoustical conformance, suspension systems, metal ceilings, fire and smoke characteristics and the like as governed by C 423, C 635, C 636, E 84 and E 119 respectively and shall be rated as Class A in all respects and shall have a smoke developed rating of less than 450.
- I. Mockup: Prior to beginning installation erect a mockup section, where directed, using all system components.
- J. Pre-installation Conference: Conduct a conference, prior to start of installation, to review system requirements, shop drawings, and all coordination needs.

1.5 SUBMITTALS – Coordinate with Section 013300

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 013300 and 013200, prepare and submit a fully developed submittal schedule; note review times set forth in Section 013300 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 013114 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Components of all suspension systems.
- B. Samples of all acoustic materials.

- C. Shop drawings for all work under this section to show layout of acoustical ceilings and details; coordinating and showing fixtures, diffusers and locations of other items occurring in ceilings, ceiling pattern, closures at walls, columns and other intersection points and further,
 - 1. Reflected Ceiling Plan(s): Indicating metal plank ceiling layout, ceiling mounted items and penetration locations.
 - 2. Suspension System and Component Layout.
 - 3. Details of system assembly and connections to building components.
- D. Certification of Specification Compliance.
- E. This Contractor shall coordinate all shop drawings well in advance with Mechanical and Electrical trades. It shall be his sole responsibility to obtain all necessary information from other trades. NO WORK WILL BE ALLOWED UNTIL APPROVAL OF SAME HAS BEEN RECEIVED FROM ARCHITECT.
- F. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.
- G. Quality Assurance/Control Submittals:
 - 1. Test Reports: Certified reports from independent agency substantiating structural compliance to governing requirements.
 - Certificates:
 - a. Data substantiating manufacturer and installer qualifications.
 - b. Certified data attesting fire rated materials comply with specifications.
 - 3. Manufacturer's Instructions: Installation instructions and maintenance data.
- H. Documentation of manufacturer's maintenance agreement/take-back program and/or green lease program for acoustical ceiling tile, including the following:
 - 1. Appropriate contact information.
 - 2. Overview of procedures. Indicate manufacturer's commitment to reclaim materials for recycling and/or reuse.
 - 3. Limitations and conditions, if any, applicable to the project.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)

- A. Deliver all materials in manufacturer's original unopened packaging fully identified with type, finish, performance data and compliance labeling.
- B. Store materials in environmentally approved conditions.
- C. Acclimate all acoustical materials a minimum of 24 hours prior to installation to stabilize moisture content and temperature.
- D. Handle acoustical materials carefully to avoid chipping edges or damaging units in any way.

1.7 ADDITIONAL MATERIALS FOR MAINTENANCE

- A. Prior to final acceptance of project, furnish to the Owner additional acoustical tile in each type and pattern installed.
- B. All materials must be new, clean, undamaged and in original containers. Furnish not less than 5% of the total quantity (full boxes) of each type and pattern installed from same run of materials installed. <u>Additional material shall not be used for punch list corrective work.</u>

1.8 SPECIAL GUARANTEE/WARRANTY TERMS

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period.

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Failures include, but are not limited to:

- 1. Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
- 2. Grid System: Rusting and manufacturer's defects
- 3. Acoustical Panels with BioBlock Plus or designated as inherently resistive to the growth of micro-organisms installed with Armstrong suspension systems: Visible sag and will resist the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
- B. Warranty Period Humiguard:
 - 1. Acoustical panels: Ten (10) years from date of substantial completion.
 - 2. Grid: Ten (10) years from date of substantial completion.
 - 3. Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max performance supplied by one source manufacturer is thirty (30) years from date of substantial completion.

1.9 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 CEILING SYSTEM

A. Acoustical material shall be manufactured to meet Federal Specification Number SS-S-118a, Class 25, noncombustible for the type, pattern, class, grade and light reflectance coefficients specified herein: Armstrong Ultima High NRC, #1941 Format 2'x 2' x 15/16" beveled tegular.

2.2 SUSPENSION SYSTEMS

A. Suspension systems provided for the execution of the work of this project shall be sufficiently rigid to support ceiling mounted lighting fixtures; provide for necessary cutouts or supports for mechanical work and the like.

System shall be classified "medium duty" complying with ASTM C 635 "Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel

Ceilings".

B. Components:

- 1. All main beams and cross tees shall be commercial quality hot dipped galvanized steel coating as per ASTM A 635 and finished as below. All steel roll-formed parts shall be chemically cleansed **hot dipped galvanized steel**; cold galvanizing or painted grids are not acceptable. Capping shall be prefinished galvanized steel in a baked polyester paint finish. Color shall match the actual color of the selected ceiling tile, unless otherwise specified. Off-white is not acceptable.
- 2. Main Beams and Cross Tees shall be double-web steel construction with 9/16 inch type exposed flange design.

Cross Tees shall have staked-on end detail allowing easy cross tee removal and remounting as well as flush fitting.

- 3. Exposed bottom flange shall be continuous with unbroken roll-formed cap, made from steel, running the length of the member.
 - a. Main Beams and Cross Tee web heights shall be minimum 1-1/2 inches in all cases.
 - b. End condition of Cross Runners: Override; quick release design.
- 4. Wall moldings shall be stepped molding with exposed flange of the same width as exposed runner.

C. Manufacturers:

	Armstrong	US Gypsum	Chicago
9/16 Std:	Suprafine XL	Centricitee DXTZ	4000
9/16 Rated:	Suprafine XLFG	Centricitee DXLTZ	4050
15/16 Std:	Prelude XL	Donn DXZ	1200
15/16 Rated:	Prelude FG	Donn DXLZ	1250

<u>NOTE</u>: Support main runners directly from hangers; do not bear and grid member on partitions or walls; do not permit any main runner to free span more than 6 inches.

2.1 HANGER SYSTEMS

- A. Hanger Wire: Hanger wire shall be galvanized carbon steel per ASTM A 641, soft temper, prestretched, with a yield stress load of at least 3 times design load, but not less than 12 gauge (0.106 inch) diameter and shall be suspended from structure tied to drop in anchors or available hanger tabs as provided under Section 05 30 00 at maximum 4 foot spacing on main tees. Provide intermediate support tie on 4 foot cross tees.
- B. Suspension tees shall be clipped or tied as required.
- C. Provide any special arrangements of suspension systems to accommodate partitions, bridging for light fixtures, registers and diffusers, and the like, all as required by the installation.

<u>NOTE</u>: Fixture clips shall be installed in each corner of the light fixtures as required by installation; coordinate with reflected ceiling drawings and/or coordination drawings as per Section 01 31 14.

- D. All ferrous metal components concealed in the work shall either be hot-dipped galvanized or precoated with rust-inhibiting paint.
- 2.2 ADHESIVES: Similar and equal to W.W. Henry "237 Acousti-Gum" standard.

2.3 OPEN CELL CEILING SYSTEM

- A. Provide Luxalon Open Cell Ceiling System manufactured by Hunter Douglas Architectural Products, Inc., 5015 Oakbrook Parkway, Suite 100, Norcross, GA 30093, USA. Ph. (800) 366-4327.
- B. Cell System component dimensions:
 - 1. Panel size: 12 inches by 12 inches.
 - 2. Material / thickness: Roll-formed 0.020 inch aluminum.
 - 3. Profile size: 2 inch high U-shaped section with 3/8 inch wide exposed face width and 3/32 inch top return flange.
 - 4. Cell size / pattern dimensions: 12 inches by 12 inches
- C. Structural Classification: intermediate duty in accordance with ASTM C 635.
- D. Cell System main runners: 8 foot by 2 inch by 3/8 inch, 0.020 inch roll-formed aluminum, with a 3/32 inch top return flange finished and fabricated to match cells.
- E. Cell System cross runners: 2 foot by 2 inch by 3/8 inch, 0.020 inch roll-formed aluminum, with a 3/32 inch top return flange finished and fabricated to match cells.
- F. Cell System Panel: exposed cell panel consisting of upper blade profiles interlocking perpendicular to lower blade profiles to form a grid of various cell sizes and patterns. Sliding clips (four per panel) are installed in lower blade sections for securing cell panel to runners.
- G. Sliding Clips: Manufacturer's standard sliding clips for securing Cell Panel to runner for providing upward or downward accessibility.
- H. SUSPENSION SYSTEM Minimum 12 gage galvanized carbon steel hanger wire to standard wire hanger clips for attachment to holes provided in main runners.
- I. TRIM AND ACCESSORY COMPONENTS
 - 1. Cover Profile: Manufacturer's standard U-shaped or angle-shaped moldings to finish all exposed cell profile ends and visible perimeter conditions.
 - 2. Splice Connectors: Manufacturer's standard main runner splice connectors and splice hanger clips.
- J. Finish: Factory applied polyester baked enamel in color as selected by the Architect.
- 2.4 Balance of materials required for the work shall be as specified elsewhere in this Section.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 INSTALLATION - GENERAL

A. Install work in strict accordance with manufacturers' recommendations, ASTM C 636 and/or requirements of the Specifications for Acoustical Tile and Lay-In Panel

- Ceiling Suspension Systems cosponsored by Acoustical Materials Association, Acoustical Contractors Association and Suspended Ceiling Manufacturers' Association and the requirements herein whichsoever is most restrictive.
- B. Joints shall be hairline, uniform and surfaces of treatment precisely aligned. Perimeter moulds shall be true to line and precise at joints. Upon completion, all acoustical ceiling installation shall present a uniform plane surface, free from blemishes and imperfections.
- C. Carefully fit units in place and lay out so as to uniformly fit the ceilings making a neat design and pattern conforming to the approved shop drawings. Any variation of unit sizes shall occur only at the borders and abutting items.
- D. Provide 2'x4' sized tiles at perimeter / border locations cut to fit conditions at areas where a perimeter tile smaller than 6" in either driection would otherwise be used. Modify ceiling grid as required for larger tile application.
- E. Unless otherwise indicated on the approved shop drawings, **contract drawings or directed by Architect**, layout system starting at center line of area so that not less than half a unit occurs at borders.
 - Arrange directionally patterned units in manner approved by the Architect.
- F. Where ceiling drops occur in acoustical ceilings, construct fascias as shown and/or required.
- G. Any acoustical work damaged, scarred, chipped, gouged, bent, out of alignment and the like, regardless of how or by whom or when, shall be replaced with new to the satisfaction of the Architect, at no increase in the Contract Price.
- H. Rout or otherwise fabricate field edges of all partial tegular tile units where set in grid, wall moulds and other ceiling penetrations to match factory fabricated edges.
- I. Install ceiling open cell panel and trim pieces with neat, tight joints and to comply with approved details. Install cell panel with lower blades perpendicular to main runners for securing sliding clips into suspension system. Scribe and cut grid components as necessary to fit at borders and other penetrations. Install edge molding trim at perimeter of metal cell ceiling system and at other locations where required to conceal edges of ceiling.

3.3 FIELD QUALITY CONTROL

A. Deflection of any grid component shall not exceed 1/360 of the span.

3.4 CLEANING

- A. Following installation, all soiled, abraded or discolored surfaces of work installed herein shall be cleaned and left free from blemishes or defects.
- B. All work that is damaged or improperly installed shall be removed and replaced and the entire installation left in complete and satisfactory condition.

C

- 3.5 WASTE MANAGEMENT Coordinate with Section 01 74 19
 - A. Separate clean waste gypsum and cellulose products from contaminants for recycling in accordance with the Waste Management Plan. Do not include any gypsum or cellulose product coated with glass fiber, vinyl, decorative paper, paint, or other finish. Place in designated area and protect from moisture and contamination.
 - B. Store panels 2 sq. ft. or larger for use in patching and small infill areas.
 - C. Existing panels removed from Project:
 - 1. Return to manufacturer for renewal/refinishing program

- 2. Pulverize clean, unpainted gypsum products and apply on-site as soil amendment in accordance with landscape specifications. Do not use products containing glass fiber. Protect granular material from moisture.
- 3. Return pure perlite products to manufacturer for recycling.
- D. Check with manufacturer for recycling options. Some manufacturers take back ceiling tile for manufacturing into new tiles.
- E. Separate metal waste, packaging, and all other materials in accordance with the Waste Management Plan and place in designated areas for recycling or reuse.

End of Section

SECTION 096500 - RESILIENT FLOORING

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements govern work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all resilient flooring work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - Provide all resilient flooring systems designated on drawings and schedules.

Resilient floor shall mean "VCT", "Enhanced VCT", "RUBBER", and such other anachronym customarily used in the industry to designate floor coverings other than carpet.

2. Provide rubber base in all areas designated on finish schedule. Base design - straight at carpet areas; cove at all others.

<u>NOTES</u>: Unless otherwise indicated or scheduled, provide vinyl bases at all partitions.

3. Prepare all floors scheduled to receive applied flooring. Provide "latex" underlayment to bring floors into specified tolerances as per Paragraph 3.02 herein.

NOTES:

 Where floors are "ramped", provide slip-resistant tile systems in lieu of regular material; material shall be certified to have minimum slip resistance characteristics of 0.6 for floors and 0.8 for ramps as promulgated by the 2010 ADA requirements.

Further, static coefficient of friction as per ASTM C 1028 conditionally slip resistant:

a. Wet: 0.50 - 0.60 b. Dry: 0.60 - 0.70

- Attention is directed to the requirement that existing expansion and control
 joints and all new joints be treated with either a crack isolation membrane or a
 "manufactured" joint system. Floor covering shall not be extended over any
 existing or new joint without this treatment.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. 033000 Plain and Reinforced Concrete
 - B. 093000 Tile Work
 - C. 096566 Rubber Sports Flooring (Multipurpose Room)
 - D. 096800 Carpet

1.4 QUALITY ASSURANCE

- A. The work of this Section shall be accomplished by a "Specialty Contractor" with mechanics skilled in the trade.
- B. Certifications
 - 1. Furnish manufacturer's certification from an independent testing laboratory acceptable to authorities having jurisdiction that resilient flooring complies with fire test performance requirements.
 - 2. Furnish certification from flooring installer that the substrate surfaces have been examined and are acceptable for installation of the Work of this Section.
- C. Fire Test Performance Provide resilient flooring which complies with the following performance criteria as determined by an independent testing laboratory acceptable to authorities having jurisdiction.
 - ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq. cm. or greater, Class I.
 - 2. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.
 - 3. ASTM E 84 Flame Spread: Not more than 25; rated as Class 1.
- D. General Performance Requirements
 - ASTM C 501 Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abrader.
 - 2. ASTM D 2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
 - 3. ASTM F 1303 Standard Specification for Sheet Vinyl Floor Covering with Backing.
 - 4. ASTM F 710 Standard for Concrete or other monolithic floors.
 - 5. Resilient Floor Covering Institute (RFCI): Standard Slab Moisture Test Method (Calcium Chloride Method) and/or The relative humidity probe method, also known as the RH test or the "in situ" test as per ASTM F2170-02, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes.

1.5 SUBMITTALS – Coordinate with Section 013300

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 013300 and 013200, prepare and submit a fully developed submittal schedule; note review times set forth in Section 013300 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 013114 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the

Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.

- A. Product Data Provide manufacturers' specifications, installation instructions and surface preparation requirements for each material specified.
 - Recycled Content:
 - a. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
 - b. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
 - c. If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
 - d. If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.
 - 2. VOC data:
 - a. Submit manufacturer's product data for adhesives. Indicate VOC limits of the product. Submit MSDS highlighting VOC limits.
 - b. Submit Green Seal Certification to GS-36 and description of the basis for certification.
 - c. Submit manufacturer's certification that products comply with SCAQMD Rule 1168 in areas where exposure to freeze/thaw conditions and direct exposure to moisture will not occur. In areas where freeze/thaw conditions do exist or direct exposure to moisture can occur, submit manufacturer's certification that products comply with Bay Area AQMD Reg. 8, Rule 51 for containers larger than 16 oz and with California Air Resources Board (CARB) for containers 16 oz or less.]
- B. Submit shop drawings, layout plan, and manufacturer's technical data and installation instructions for all tile flooring and accessories.
- C. Samples
 - 1. For Initial Selection: Submit actual sections of resilient flooring materials, showing full range of colors and patterns available, for each type of resilient flooring required.
 - 2. For Verification, prior to installation, submit the following:
 - a. Resilient tile: Full size, each type, size and color specified.
 - b. Sheet Flooring: 12 inch square section.
 - c. Base: 12 inch long sections, each type and color specified.
 - d. Adhesives: One pint, each type, labeled to indicate location of use and type of surface to receive product.
 - e. Floor Finish: One pint.
- D. Submit a copy of the manufacturer's recommended maintenance procedures for resilient flooring and accessories provided under this Section.
- E. Certification of Specification Compliance.
- F. Material Safety Data Sheet (MSDS) must be submitted for each product.
- 1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)
 - A. Store materials (resilient flooring, base and adhesives) in location having a minimum temperature of 65 degrees F for at least 24 hours prior to start of laying of flooring.

1.7 PROJECT CONDITIONS/REQUIREMENTS AND RESTRICTIONS

- A. Environmental Requirements: Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65 degrees F (18 degrees C) for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55 degrees F (13 degrees C) in areas where work is completed.
- B. Install resilient flooring and accessories after other finishing operations, including painting, have been completed. Do not install resilient flooring over concrete slabs until the same are cured and sufficiently dry to achieve bond with adhesive as determined by manufacturer's recommended bond and moisture test which will determine if their moisture content and alkalinity are within acceptable limits for installation of resilient flooring as specified in Part 3.
- C. Prior to installation ascertain that the building is sufficiently weathertight to prevent damage to the work. Roofing and roof flashings shall have been completed and roof found to be watertight. All exterior openings shall have been glazed or otherwise weather protected.
- D. All work of a nature conducive to high humidity conditions shall have been completed and be thoroughly dry. This contractor shall be held responsible for the cost of replacing all work of this Section damaged due to his failure to take the above precautions.

1.8 ADDITIONAL MATERIALS FOR MAINTENANCE

- A. Prior to final acceptance of the project, furnish to the Owner additional resilient flooring, and base in each color, type and pattern installed. All materials must be new, clean, undamaged and in original containers.
- B. Furnish materials at the rate of 1 carton for each 1000-1500 sq. ft. Furnish 1 roll of rubber base for future replacement. Additional material shall not be used for punch listing.
- C. Furnish stair tread maintenance materials as follows:
 - 1. 10 treads, longest length.
 - 2. 10 tiles
 - 3. All maintenance material shall be furnished in colors selected and in direct proportion to colors installed.

1.9 SPECIAL GUARANTEE/WARRANTY TERMS

- A. Rubber Material defect warranty 12 months; 10 year wear warranty no more than 10% wear in five years and no more than 20% wear in ten years.
- B. Enhanced vinyl tile 10 years
- C. Thermoplastic flooring 10 years

1.10 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.

- 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
- 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
- 9. Do not contain methylene-chloride.
- 10. Do not contain chlorinated hydrocarbons.
- 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 VINYL ENHANCED COMPOSITION TILE:

- A. Meets performance requirements for ASTM F 1700, Class 1 Type A, Standard Specification
- B. Wear layer/Overall thickness: 3 mm
- C. Tile size: 18" x36"
- D. Installation: Brick Ashlar.
- E. Slip Resistance: ADA Compliant.
- F. Commercial Grade Homogenous Vinyl Tile
- G. ASTM E 648, Standard Test method for Critical Radiant Flux of 0.45 watts/cm2 or greater, Class I.
- H. Manufacturers: Mohawk Group. Creative Terrain CO181, Field Tile- Torrent 745, Accent color: Cascade 547
 - Or equal product with the same characteristics and performance standards.
- I. Provide loose lay mock up for owners approval.

2.2 ACCESSORIES

- A. Rubber Base shall be a thermoplastic composition combined with high quality additives and colorants designed specifically to meet the performance and dimensional requirements of ASTM F 1861, Type TP, Group 2 (solid) Standard Specification for Resilient Wall Base and shall conform to the following physical characteristics.
 - 1. Compression type.
 - 2. 4 inch high, .080 inch thick (tolerance ± .005 inch).
 - 3. Top corner rounded, bottom coved, arranged for above floor application for tile areas; toeless for carpet applications.
 - 4. 120' (36.58 m) coiled lengths.
 - 5. Furnish inside and outside corners with 4 inch (10.16 cm) returns.
- B. Base shall comply with the following performance characteristics.
 - 1. Hardness ASTM D 2240: Rubber 85 Shore A.
 - 2. Flexibility Will not crack, break, or show any signs of fatigue when bent around a 1/4 inch (6.4 mm) diameter cylinder.
 - 3. Meets or exceeds the performance requirements for resistance to heat/light aging, chemicals, and dimensional stability when tested to the methods, as described, in ASTM F 1861.
 - 4. Fire Resistance: ASTM E 84/NFPA 255 (Steiner Tunnel Test) Class C; ASTM E 648/NFPA 253 (Critical Radiant Flux) Class 1; ASTM E 662/NFPA 258 (Smoke Density) 450 or less.

Manufacturers – Flexco "Base 2000"; Mercer; Musson; Johnson or approved equal.

C. Vinyl Saddles, Reducing Strips and Termination Accessories.

Flush or tapered as indicated.

Thickness to match adjacent material.

Colors as selected.

Manufacturers - Tarkett, Nafco, Mercer, or approved equal.

2.3 UNDERLAYMENT

- A. Material for use shall be as recommended by flooring material manufacturer; use where necessary to level floors, fill depressions, etc. to insure conformance as noted in Paragraph 3.02 herein.
- B. Products shall be similar and equal to Henry #445 or #547 as suitable for the proposed installation.

2.4 ADHESIVES AND PRIMERS

- A. Materials shall be "v.o.c." compliant (green) and suitable for intended purpose be it tile, treads or other such resilient flooring material; location and structural conditions required and/or intended; use without adulteration or reducing and in accordance with manufacturer's printed instructions; types for each use shall be approved by the manufacturer of the respective materials and certifications of same in writing, shall be delivered to the Architect.
- B. Conventional resilient floor tile adhesives shall be as manufactured by:
 - 1. Mohawk M99 Adhesive for floor tile or other prime tile manufacturer nominated for the work of this Section.
- C. Rubber tile adhesive will be similar and equal to Henry #452 epoxy or adhesive of nominated prime tile manufacturer when used over underlayment and when applied in a dry environment. When rubber floor is installed over floors on grade, without underlayment, same shall be set in a polyurethane adhesive as recommended by the tile manufacturer.
- D. Wall Base adhesive: Similar and equal to Henry "595 Cove Base Adhesive".

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 PREPARATION, GENERAL

- A. Surfaces receiving resilient flooring shall not vary more than 1/8 inch in 10 foot distance, more than 1/16 inch within any 1 foot distance. Any deviation from this tolerance shall be filled by the Contractor with underlayment material approved by the flooring manufacturer for use under adhesive and resilient flooring specified herein; FURTHER, This Contractor shall patch and level all minor surface imperfections such as cracks, rough areas and depressions in all concrete floor slabs to receive resilient flooring in accordance with above tolerance statement.
- B. Perform a bond and moisture test as recommended by the resilient flooring manufacturer on concrete subfloors to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and any other coatings; and ready to receive resilient flooring.

C. Remove from the subsurface all dirt, grease, oil, dust and other materials which might impair adherence of resilient flooring and base. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring and/or base.

3.3 INSTALLATION - GENERAL

- A. All floor coverings shall be installed in full accordance with the manufacturer's written instructions, using recommended adhesives, tools, and procedures. Observe the recommended adhesive trowel notching, open times, and working times.
- B. No resilient flooring shall be set where it is required to be flush with other finishes until such other finishes have been installed and approved.
- C. Lay resilient flooring only while adhesive has proper tack, starting at center and working toward walls. Borders of field shall be equalized and no marginal tile shall be less than 4 inches wide, except where tile abuts askew vertical wall surfaces.
- D. Marginal tile shall extend full width thru door openings to adjoining areas having like floor covering and have as few cross joints as possible, none of which shall occur in the center of the opening.
- E. At door openings between spaces having two different types or colors of floor materials of the same thickness and at which no saddle or metal edge strip is indicated on the drawings, make the change of finish material under the door in a closed position. Except where otherwise noted in Finish Schedules, extend like flooring materials into all closets and the like opening into rooms and other spaces having resilient flooring.
- F. Joints shall be tight, straight and inconspicuous; parallel to and at right angles with the enclosing walls and symmetrical with centerlines of rooms unless otherwise noted.
- G. Flooring shall not be cut except at walls and other abutting surfaces and materials. Holes required for pipes or other penetrations shall be neatly cut and flooring closely fit so as to leave no space for dirt to collect. Seal joints inconspicuously with waterproof floor mastic around pipes and at other vertical surfaces.
- H. All finish floor surface shall be smooth and free from buckles, waves, projecting edges, cracks and breaks.
- I. Provide tapered edge strips where edge of tile is exposed, and elsewhere as may be indicated on the drawings.
- J. Provide tapered or flush vinyl saddles as indicated on the project drawings at door and other openings between floor materials of different patterns or colors; one piece, color as selected.
- K. All work shall be neatly fitted around work penetrating floors and neatly scribed to abutting surfaces.

3.4 RUBBER BASE INSTALLATION

- A. Installation shall not begin until flooring is completed and approved.
- B. Install on walls, partitions, columns, piers, cabinets, etc., to form continuous base at junction of vertical surfaces and finished floors.
- C. Keep vertical joints to a minimum by setting long strips.
- D. Base shall be continuous around external corners and lap a minimum of 6 inches.
- E. Base shall be continuous around internal corners and lap a minimum of 2 inches.
- F. When base terminates at external corner, provide integral molded corner.

3.5 CLEANING

- A. Promptly remove all excess adhesives and other surface soiling or stains from face of all flooring, bases and adjoining surfaces using cleaning agents recommended by the manufacturer of the material being cleaned.
- B. Perform initial maintenance according to the flooring manufacturer's instructions.
- C. Any adhesive, caulking or other mastic on exposed faces shall be immediately removed with a recommended solvent.
- D. Sweep-clean the thermoplastic floor after installation and clear area of scrap materials. The floor can be saturated and then deck brushed, power washed, or power scrubbed to remove construction debris. Installer shall provide two copies of manufacturers cleaning recommendations for contractor and owner use.

3.6 PROTECTION

- A. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.
- B. All rooms or spaces in which resilient floors are being laid shall be closed to traffic or other work and kept closed until floors are completed and firmly set.
- C. Just prior to final acceptance of the project, leave all resilient floors polished, buffed, clean, whole and in perfect condition.

3.7 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality: Ventilate products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously for minimum 72 hours. Do not ventilate within limits of Work unless otherwise approved by Architect.

3.8 WASTE MANAGEMENT – Coordinate with Section 01 74 19

- A. Separate waste in accordance with the Waste Management Plan and place in designated areas in the following categories for reuse:

 Sheet materials larger than 2 sq. ft.
 - Tiles larger than 1/2 tiles
- B. Close and seal tightly all partly used adhesive containers and store protected in well-ventilated, fire-safe area at moderate temperature.

End of Section

Orange-Ulster BOCES
Interior Alterations – Third Floor
Regional Education Center at Arden Hill

SECTION 096800 - CARPET

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements govern work in this Section.

1.2 DESCRIPTION OF WORK

A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of <u>carpet floor finish and requisite preparation</u> for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:

NOTE: All carpets furnished herein shall carry the "CRI Green Label" showing conformance to the voluntary testing program established for "VOC" controls by the Carpet and Rug Institute; all material shall be delivered to the project site with "label" attached.

- 1. Provide carpet in all spaces indicated in the Finish Schedule and where indicated on the drawings.
- 2. Floor preparation shall be as specified herein and in coordination with Section 096500 for leveling systems.
- 3. Prepare existing floors to receive specified materials in accordance with Paragraph 3.02 herein.
- 4. Accessories are to be furnished by Section 096500 and installed by this Contractor.

<u>NOTES</u>: After installation and in areas requiring further work by other trades, this specialty contractor shall protect all carpeting with a layer of nonreinforced heavy building paper with all edges lapped not less than 6 inches and sealed with nonstaining adhesive; keep paper in repair and remove when directed by the Architect in preparation for "final cleaning" as specified in Section 017700.

- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. 09 65 00 Accessory materials

1.4 QUALITY ASSURANCE

- A. The work of this Section shall be accomplished by a "Specialty Contractor".
- B. Coordinate with the General Contractor for scheduling, receiving and placement on floors of materials from the manufacturer.
- C. Materials shall be delivered to the "workroom" in the manufacturer's bundles and shall be clearly marked as to size, dye lot, and materials. Material shall be unrolled, checked for quality and conformity, cut and redelivered to the project site as part of the work of this Contract. A written record of receipt of materials shall be submitted to the Architect.
- 1.5 SUBMITTALS Coordinate with Section 013300
 - Submittals shall be made in groupings where installations are complementary, i.e.

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- steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 013300 and 013200, prepare and submit a fully developed submittal schedule; note review times set forth in Section 013300 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 013114 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Provide reports documenting the results of the following tests by a NVLAP approved laboratory covering Electrostatic Propensity and Flooring Radiant Panel Test (test report not to exceed two years old)
- B. Provide shop drawings of areas to be carpeted showing seams and cut sheet for carpet.
- C. Sample of carpet proposed, including certification that said carpet meets the specifications in all aspects including -
 - 1. Construction including nominated design pattern
 - 2. Yarn Weight (+)10%, (-)5%
 - 3. Pitch (+/-)0 inches
 - 4. Pile Height (+)0 inches, (-)0.030 inches
- D. Samples of colors for approval.
- E. Carpet adhesive.
- F. Provide product data information from manufacturer to include:
 - 1. Catalog data and product physical characteristics documentation.
 - 2. Manufacturer's printed installation instructions for carpet, surface preparation, seaming techniques, recommended adhesives and other installation accessories.
 - 3. Statement verifying environmental claims or requirements such as recycled content, recyclability, etc.
 - 4. Manufacturer's published written warrant information.
- G. Provide the Owner with 6 copies of the carpet manufacturer's complete manual of maintenance recommendations for the quality of carpet installed.
- H. Bale tickets showing quality numbers and register numbers for each carpet provided shall be included with maintenance instructions.
- I. All dimensions shall be verified in the field prior to installation.
- J. The Contractor's attention is directed to the New York State Fire Code as it relates to regulations controlling decoration, furnishings and interior finishes as they affect the work of this Contract. It is deemed the sole responsibility of the vendors furnishing fabrics, floor coverings, ceiling finishes, wall coverings and finishes and the like as covered by the regulations to submit applications and obtain approvals for same without additional charges to the Owner. Failure to obtain, and submit, approvals in accordance with requirements of Section 01 33 00 will result in rejection of any submittal for this phase of the work, i.e. Certification of Carpet Finish Rating.

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K. Material Safety Data Sheet (MSDS) must be submitted for each product.

1.6 TESTING PROCEDURES

A. Testing shall be conducted by a NVLAP approved laboratory in accordance with the standard test methods specified below:

TEST	METHOD
Pile Fiber Identification	AATCC 20
Backing Material Identification	ASTM D 629
Average Finished Pile Weight (w)	ASTM D 5848
Finished Pile Thickness	ASTM D 7241 or ASTM D 6859, ASTM D 5823
Hexapod Tumble Tester &	ASTM D 5252 and ASTM D 7330
Assessment	
Tuft Bind	ASTM D 1335
Flammability - Small Scale Ignition	16 CFR 1630 or ASTM D 2859
Test	
Flammability - Flooring Radiant Panel	ASTM E 648
Smoke Density	ASTM E 662
Colorfastness to Crocking	AATCC 165
Colorfastness to Light, Xenon-Arc	AATCC 16
Indoor Air Quality	ASTM D 5116, CRI Green Label, or Green
	Label Plus™
De-lamination Resistance	ASTM D 3936
Electrostatic Propensity	AATCC 134
Extraction Cleaning	AATCC 171
Carpet Tile	
Dimensional Stability	ISO 2551
Tile Thickness	ASTM D 3676 or ASTM D 3574
Volume Density	ASTM D 3676 or ASTM D 3574
Compression Force Deflection	ASTM D 3574
Compression Set	ASTM D 3676 or ASTM D 3574 or ASTM D
	1667

1.7 ADDITIONAL MATERIALS FOR MAINTENANCE

- A. Prior to final acceptance of the project, furnish to the Owner additional carpet in each color, type and pattern installed.
- B. All materials must be new, clean, undamaged and in original wrappings.
- C. Furnish not less than 5% of the total quantity of each color, type and pattern installed from the same run of materials. <u>Additional material shall not be used for punch listing</u>.

1.8 SPECIAL GUARANTEE/WARRANTY TERMS

- A. This Contractor shall, if required, restretch the carpet, repair seams, joints and edges once the original installation is completed within the 1 year guarantee period; further,
- B. This Contractor shall provide an unconditional guarantee covering further restretching, repair of seams, puckering and any other defects that might be directly pointed to defects in workmanship during the 1 year guarantee period.
- C. This Contractor shall provide an unconditional guarantee covering replacement

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and relaying of tiles and any other defects that might be directly pointed to defects in workmanship during the 1 year guarantee period.

- D. The material provided under this Contract shall be furnished with the following additional warranty terms and conditions.
 - 1. A 10 year wear warranty;
 - 2. Certified static control with a maximum of 3.0 kv:
 - 3. Tuft bind rated at 20 pounds;
 - 4. Delamination guarantee from backing at 20 pounds per inch in accordance with ASTM D 3936.

1.9 SITE ENVIRONMENTAL PROCEDURES

- A. Indoor Air Quality:
 - 1. Temporary ventilation: Provide temporary ventilation as specified in Section 015000 and as follows:
 - a. Ventilate products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously for minimum 72 hours. Do not ventilate within limits of Work unless otherwise approved by Architect.
 - 2. Immediately after installation, clean carpet thoroughly with a highefficiency particulate air (HEPA) filtration vacuum or a certified CRI Green Label vacuum cleaner.
 - 3. Final cleaning: As specified in Section 017400 Progress Cleaning.

1.10 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 SPECIFICATION STANDARD: For purposes of establishing standards of quality <u>and</u> levels of performance and not for the purposes of limiting competition, the basis of this specification is upon material as manufactured by one of the following and their respective model suitable for the intended application.

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Carpet Typical classrooms-

Mohawk Industries, Emanating Echoes, Introspective Thoughts GT344. Color 525

Wickham Format 24" x24"

Offices- Mohawk

Industries

Shape and Flow Flux Foundation BT585 Color 924 Outfall Format 24" x 24"

2.2 CARPET PERFORMANCE REQUIREMENTS

- A. Flammability: Class 1 or A
- B. Minimum Critical Radiant Flux: 0.45/cm² as per ASTM E 648
- C. Smoke Density: Less than 450 as per ASTM E 662
- D. Wear Performance: 10 years
- E. Traffic Class: Heavy
- F. AADAG Compliance: COF less than 0.6 for Accessible Routes

2.3 CARPET SETTING MEDIUMS

- A. Carpet adhesive
 - 1. Henry Company #356, Multi-Purpose White
 - 2. Columbia LC #1479
 - 3. Kinkead Industries KS #155M
 - 4. XL Flooring Special Purpose LS 4000
 - 5. Carpet tile adhesive shall be a quick release formulation as recommended by the manufacturer of the carpet tile.

2.4 CARPET ACCESSORIES

- A. Edge strips, reducers and the like shall be standard manufactured vinyl or custom fabricated metal to be used as conditions required for use where carpet adjoins other floor level finishes.
- B. Size accessories as required and/or as shown on the drawings.
- C. Coordinate type and location where used with the Architect.
- 2.5 Balance of materials required for the work shall be as specified elsewhere in this section.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 PREPARATION OF EXISTING FLOORS

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- A. All existing floor surfaces shall be patched with matching material to provide level surface or shall be "flashpatched" by this Contractor to provide a level surface to receive flooring.
- B. Remove from the subsurface all dirt, grease, oil, dust and other materials which might impair adherence of carpet adhesive.
- C. This work requires complete and close coordination with other specialty contractors to determine the extent of floor patching, levelastic treatment, liquid underlayment, wood underlayments and the like.
- D. Final coordination is the responsibility of the General Contractor.

3.3 INSTALLATION - Direct Glue Down

- A. Lay all carpet in accordance with the shop drawings in a direct manner.
- B. Fit and pattern match all carpet, dry, prior to placement of goods.
- C. Provide direct glue-down adhesive spread to recommended rate over prepared subfloors. All preparation and application shall be as recommended by the Manufacturer of the carpet and adhesive. Apply carpet adhesive to all seams and perimeter in sufficient amounts and in areas in between to keep carpet from shifting or buckling.
- D. Place all carpet within 20 minutes after spreading of adhesive, unrolled in line and rolled with a 30 pound roller to insure full adhesion to floor and to remove any and all bubbles or buckles.

E. SEAMING

- 1. All selvage edges <u>must</u> be removed; all cut made on a slight angle with surface yarns extending outward over backing material.
- 2. Seaming shall be done with an approved quick setting seaming adhesive as recommended by the manufacturer and applied according to his directions and specifications; prior to seals being made, apply a bead of carpet seam adhesive to all cut edges.
- 3. After seaming application, press seams by hand and/or suitable tool to produce the best possible even top pile and then sandbag until adhesive has set in minimum of 8 hours.
- 4. Contractor shall follow the instructions of the carpet manufacturer with regard to seaming.
- 5. Seams shall be located following shop drawing layouts approved by the Architect.

3.4 CARPET TILES

- A. Install carpet tiles in full bed of manufacturer's approved limited bind, quick release adhesive rolled, trowelled or sprayed on to the prepared floor.
- B. Lay modules in continuous pattern with the directional arrows pointing in one direction unless otherwise directed by the Architect.
- C. Trim edges of modules to fit tight and true to leading edge of broadloom at iunctures.

3.5 ADJUSTMENTS, PROTECTION AND CLEANING

- A. Protect adjoining surfaces from damage and shall be responsible for restoring them to their original condition if damaged.
- B. All usable pieces of carpet not necessary to complete the work shall be turned over to the Owner.
- C. Remove all rubbish, wrapping paper, protective paper, waste and excess materials

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- and all tools and equipment upon the completion of the installation.
- D. Remove all adhesive, repair and/or replace damaged or unacceptable areas to the satisfaction of the Architect and Owner.
- E. The Contractor shall be responsible for a thorough vacuum cleaning of all carpeted areas upon completion of the work as per Section 017700.

3.6 WASTE MANAGEMENT – Coordinate with Section 017419

- Select carpet from manufacturers that take back their products for reuse or recycling.
- B. Separate waste in accordance with the Waste Management Plan. Set aside and protect offcuts and remainder greater than 1 sq. yd. for reuse by Owner or nonprofit organizations such as Habitat for Humanity.
- C. Close and tightly seal all partly used adhesive containers and store protected in well-ventilated, fire-safe area at moderate temperature

End of Section

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SECTION 099000 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following interior and exterior substrates:
 - 1. Concrete masonry units (CMU).
 - 2. Concrete
 - 3. Gypsum board.
 - 4. Wood
- B. Related Sections include the following:
 - 1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint 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 proposed product highlighted.

1.3 QUALITY ASSURANCE

- A. MPI Standards: Maintain copy of this standard at the Project site at all times.
 - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

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- B. Mockups: Apply benchmark samples 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. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
 - 2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
 - 3. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.4 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.

1.5 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints 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 paints in snow, rain, fog, or mist; 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.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. PPG Architectural Finishes, Inc.
 - 3. Sherwin-Williams Company.

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2.2 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 of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the OTC (Ozone Transport Commission) restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
 - 1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
 - 2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
 - 3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 - 4. Floor Coatings: VOC not more than 100 g/L.
 - 5. Shellacs, Clear: VOC not more than 730 g/L.
 - 6. Shellacs, Pigmented: VOC not more than 550 g/L.
 - 7. Flat Topcoat Paints: VOC content of not more than 50 g/L.
 - 8. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
 - 9. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 - 10. Floor Coatings: VOC not more than 100 g/L.
 - 11. Shellacs, Clear: VOC not more than 730 g/L.
 - 12. Shellacs, Pigmented: VOC not more than 550 g/L.
 - 13. Primers, Seaters, and Undercoaters: VOC content of not more than 200 q/L.
 - 14. Dry-Fog Coatings: VOC content of not more than 400 g/L.
 - 15. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 q/L.
 - 16. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.
 - 17. Fire Retardant Paint: VOC content of not more than 60 g/L.
- C. Colors: If not scheduled, as selected by Architect from manufacturer's full range based on the use of 8 colors plus black and white. Two stain colors to be provided.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

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B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

Concrete: 12 percent.
 Masonry: 12 percent.
 Gypsum Board: 12 percent.

4. Wood: 15 percent

- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that 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.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers 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.
- E. Concrete Masonry Substrates: Remove 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.
- F. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

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- I. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac
 or other recommended knot sealer before applying primer. After priming, fill holes
 and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth
 when dried.
 - 2. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
 - 3. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
 - 4. When transparent finish is required, backprime with spar varnish or polyurethane.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 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.
- B. Application Procedures: Apply paints and coatings by brush or roller according to the manufacturer's directions, except as noted below. Spray application is not permitted for trim, ceilings and walls, unless specifically approved by Architect in advance for each individual situation. Roller application on woodwork is not permitted.
 - 1. 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.
 - 2. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
 - 3. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
- C. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- D. 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.

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- E. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- F. 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.
- G. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
 - 1. Mechanical Work:
 - Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Tanks that do not have factory-applied final finishes.
 - e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
 - 2. Electrical Work:
 - a. Switchgear.
 - b. Panelboards.
 - c. Electrical equipment that is indicated to have a factory-primed finish for field painting.
 - d. Exposed conduits and wiremold

3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
 - 1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

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3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- 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. Protect work of other trades against damage from paint application. Correct damage to work of other trades 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 painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. General: Provide listed products or equal products of other named manufacturers in Part 2.
- B. Gypsum Board Ceilings: Flat acrylic finish.
 - 1. Prime Coat: Latex-based, interior primer; MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified.
 - a. Benjamin Moore; Ultra Spec 500 Interior Latex Primer N534
 - 2. Intermediate Coat and Topcoat: Factory-formulated flat acrylic latex paint for interior application; MPI # 53, X-Green 53, 143, X-Green 143, LEED 2009, LEED V4, CHPS Certified.
 - a. Benjamin Moore; Ultra Spec 500 Interior Latex Flat N536
- C. Gypsum Drywall Walls: Low-luster (eggshell), acrylic finish.
 - 1. Prime Coat: Latex-based, interior primer; MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified.
 - a. Benjamin Moore: Ultra Spec 500 Interior Latex Primer N534
 - 2. Intermediate Coat and Topcoat: Low-luster (eggshell or satin), acrylic-latex, interior enamel; MPI # 52, X-Green 52, 145, X-Green 145, 139, X-Green 139, LEED 2009 LEED V4, CHPS Certified.
 - Benjamin Moore; Ultra Spec 500 Latex Eggshell N538.
- D. Gypsum Drywall Walls at Bathrooms and Janitor's Closets: Semi-Gloss, waterborne acrylic epoxy finish.
 - 1. Prime Coat: Latex or two component epoxy-based, interior primer; MPI # 6, 17, X-Green 17, 39, 137, X-Green 137, LEED Credit, CHPS Certified.

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- a. Benjamin Moore; Fresh Start Multi-Purpose Primer N023.
- 2. Intermediate Coat and Topcoat: Two component semi-gloss acrylic-epoxy; Interior/Exterior Epoxy (water based), LEED 2009.
 - Benjamin Moore; Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss V341.
- E. Hollow Metal Doors, Frames, and Sidelights, and Ferrous Metals: Semigloss, acrylic-enamel finish.
 - 1. Prime Coat: Rust-Inhibitive Primer (Water Based), MPI #107, X-Green 107, 134, LEED 2009, CHPS Certified.
 - a. Benjamin Moore; Super Spec HP Acrylic Metal Primer P04.
 - 2. Intermediate Coat and Topcoat: Factory-formulated semigloss acrylic-latex enamel for interior application; MPI # 141, X-Green 141, 153, X-Green 153, LEED 2009, LEED V4.
 - a. Benjamin Moore; Ultra Spec HP D.T.M. Acrylic Semi-Gloss Enamel, HP29
- F. Concrete Masonry Units (CMU): Alkyd, water-based finish; in sheen as selected by Architect.
 - 1. Prime Coat/Block Filler: MPI # 4, X-Green 4, LEED 2009, LEED V4, CHPS Certified.
 - a. Benjamin Moore Super Spec Masonry Interior/Exterior Hi-Build Block Filler 206.
 - 2. Intermediate Coat and Topcoat: Alkyd, water-based finish; LEED 2009, LEED V4, CHPS Certified. One of the following:
 - a. Satin: Benjamin Moore Advance Waterborne Interior Alkyd Satin 792.
 - b. Semi-Gloss: Benjamin Moore Advance Waterborne Interior Alkyd Semi-Gloss 793.
 - c. High Gloss: Benjamin Moore Advance Waterborne Interior Alkyd Gloss 794.
- G. Concrete Masonry Units (CMU) at Bathrooms and Janitor's Closets: Semi-Gloss, waterborne acrylic epoxy finish.
 - 1. Prime Coat: Acrylic block fillerior primer; LEED 2009.
 - a. Benjamin Moore; Corotech Acrylic Block Filler V114...
 - 2. Intermediate Coat and Topcoat: Two component semi-gloss acrylic-epoxy;Interior/Exterior Epoxy (water based), LEED 2009.
 - Benjamin Moore; Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss V341

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- H. Stained Wood and Woodwork: Satin, waterborne clear acrylic urethane over stain.
 - 1. Stain Coat: Penetrating wood stain, water-based; MPI # 186 LEED Credit.
 - a. Lenmar (Benjamin Moore); Waterborne Interior Wiping Stain 1WB.1300 (240 g/L)
 - 2. Intermediate Coat and Topcoat: Satin, interior waterborne clear acrylic urethane varnish; MPI # 121, 128.
 - Lenmar (Benjamin Moore); Waterborne Aqua-Plastic Urethane Satin, 1WB.1427 (335 g/L)
- I. Natural-Finish Wood and Woodwork: Satin, waterborne clear acrylic urethane.
 - 1. Three Finish Coats: Satin, interior waterborne clear acrylic urethane varnish; MPI # 121, 128.
 - a. Lenmar (Benjamin Moore); Waterborne Aqua-Plastic Urethane Satin, 1WB.1427 (335 g/L).

END OF SECTION 099100

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SECTION 101100 - VISUAL DISPLAY BOARDS

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements govern work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of <u>visual display boards</u> for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - 1. Provide new porcelain enamel on steel dry marker boards in locations as shown on the drawings and/or as approved by the Architect (Labeled on floor plans as "WB")
 - a. Marker Boards to be 4' high x 6' wide typical unles otherwise noted.
 - 2. Provide ground systems and prefinished aluminum trim as required by details.
 - 3. Provide one 10' long map/display rail system at each classroom space in location as selected by Architect.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification.

1.4 QUALITY ASSURANCE

- A. Requirements given herein may be affected by other related requirements of the project specification. Correlation of contract requirements is the responsibility of the Contractor.
- B. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of visual display boards in the United States, making the types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of 10 years.
- C. Installer Qualifications: Acceptable to the manufacturer.
- D. Single Source Responsibility: Obtain visual display boards of each type from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the work.
- E. Product Certifications required:
 - 1. Provide GREENGUARD Indoor Air Quality Certified® and GREENGUARD Children and Schools certificates for all products.
 - 2. Provide MBDC Cradle to Cradle, certification for all writing surface facing sheets.
- F. Performance Requirements:
 - 1. Reflectivity: Not to exceed specified range when tested at 60 degrees with a gloss meter in accordance with ASTM C 523.
 - 2. Contrast for marker boards (Light and Dark Effects): not more than 11.7 when tested with a BYK-Gardner Wave Scan 5+ Measurement Device showing visual acuity to the human eye at distances greater than 3 meters (10 feet).
 - 3. Surface Resistance: Resistant to stains, scratches, bacteria, fire, chemicals, and graffiti.

1.5 SUBMITTALS – Coordinate with Section 013300

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 013300 and 0132 0, prepare and submit a fully developed submittal schedule; note review times set forth in Section 013300 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Samples showing full color range available for each type of board to be incorporated in the work. Writing board samples shall be 3 inch by 5 inch of each porcelain enamel writing surface showing color, texture, and thickness of porcelain coatings, gauge of metal, thickness and type of core material, and thickness of backing sheets. Tack surface samples shall be of size above of each type of unit showing overall construction.
- B. Samples, 12 inches long for each type of frame, trim and accessory items.
- C. One of each type wall clip or anchoring device.
- D. Shop drawings showing:
 - 1. Location, dimensions, arrangement, of each board assembly required for the work.
 - 2. Indication of joints, backing anchor, mounting details, trim, and accessories.
 - 3. Cutouts for penetrations such as clocks, lights, and outlets.
- E. Manufacturer's Literature: Printed technical specifications, catalog data, and details of products.
 - Recommended installation and maintenance instructions.
- F. Certification of Specification Compliance.
- G. Material Safety Data Sheet (MSDS) must be submitted for each product.
- 1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 016100)
 - A. Store sheet materials flat on blocking or supports to retain original shape.
 - B. Maintain minimum ambient temperature of 55 degrees F (13 degrees C) continuously from 24 hours before installation to 24 hours after installation.
- 1.7 JOB CONDITIONS
 - A. Assure adequate ventilation when using adhesives.
- 1.8 SPECIAL GUARANTEE/WARRANTY TERMS

A. Written guarantee against material failure for 50 years on porcelain enameled steel chalk and dry marker boards and 2 years on corkboards.

1.9 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 WHITE BOARDS

- A. Facing Sheet:
 - 1. Writing coat:
 - a. Fired vitreous porcelain enamel, minimum thickness 0.003 inches.
 - b. Surface to show no trace of previous writing after being washed.
 - 2. Ground coat:
 - a. Cobalt primer.
 - b. Minimum thickness 0.0025 inches.
 - c. Applied to both sides of base metal.
 - 3. Base metal:
 - a. Enameling grade steel, ASTM A 424, with nickel deposition 2 grams/sq.ft., both sides.
 - b. Minimum thickness: 24 gauge.
- B. Core: 3/8 inch "MDF" or core as standard with the manufacturer.
- C. Laminating Adhesive: Manufacturer's standard, moisture resistant, fungus resistant, thermoplastic type.
- D. Adhesive: Manufacturer's standard.
- E. Backing:
 - 1. Aluminum sheet, 0.015 inch thick.
- F. Approved Manufacturers:
 - 1. Claridge
 - 2. Architectural School Products, Inc.
 - 3. Aywon

2.2 GROUNDS

A. Erect continuous galvanized steel grounds of 16 gauge metal, straight and true, blocked out with cadmium-plated metal shims for proper alignment, securely

- fastened at intervals not over 20 inches on centers. Grounds shall be secured with 1/4 inch expansion or toggle bolts for chalk troughs, 3/16 inch in other locations.
- B. Contractor has option of substituting aluminum grounds (minimum .062 gauge) in lieu of galvanized steel complete with clips and clamps. Aluminum grounds shall be similar in size and shape to galvanized steel grounds.

2.3 CLIPS AND CLAMPS

- A. Trim and chalk tray clips, of approved size, thickness and spacing, shall be galvanized steel plate formed to receive trim and to lap edges of board not less than 1/4 inch.
- B. Clamps of approved size, thickness and spacing shall be of galvanized steel and secured to grounds in such a manner as to provide permanent alignment of display board face.
- C. Furnish clips and clamps and securely fastened to grounds at the time of setting display boards.
- D. Place clips and clamps adjacent to all joints and corners on vertical and horizontal corners and at intermediate points not over 16 inches on centers.

2.4 FRAMES AND TRIM

- A. Trim systems including jambs, mullions, map and display rails, corner sections and chalk trays shall be of extruded aluminum in snap-on or custom field fit design as manufactured by the maker of the board being trimmed.
- B. Trim finish 70% Kynar resin coated.
- C. See schedule on drawings and special details for height of all frames.
- D. Trim members shall be in single length, straight and true, free of defects.
- E. Provide map rails (tack design) in all areas as scheduled.

2.5 VISUAL DISPLAY RAIL

- A. All display rails shall be products of AS Hanging Systems, US Distribution Center, 8396 State Route 9, West Chazy, NY 12992. Canadian Distribution Center, 3600 Matte Blvd., Unit L, Brossard QC J4Y 2Z2 Canada. Toll free: 866-935-6949, Phone: 450-619-7999, info@ashanging.com.
- B. Casso™ Display Rail: Convenient non-roller design that also does not require tacks, push-pins or staples. Does not employ a hinge type mechanism. Material inserts from below display rail. No exposed mounting fasteners. No need to drill mounting holes. Extendable on both ends and includes finishing end caps. Extruded aluminum with standard silver satin anodized finish.
 - 1. Track Length: 10'-0" long unless otherwise indicated.

2.6 FABRICATION

- A. Assembly: Provide factory-assembled tackboard units in single units without joints and in sizes as indicated on drawings, unless field-assembled units are required.
 - 1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.
 - 2. Provide manufacturer's standard butt type vertical joint system between abutting sections of markerboards, with concealed vertical spline without exposed trim.
 - 3. Provide manufacturer's standard mullion trim at joints between tackboards.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

- A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.
- B. For board installations, check surface conditions to assure that they are -
 - 1. Free from dust, dirt or scaling paint:
 - 2. Free from projections or depressions that affect smooth finished surfaces of boards:
 - 3. Dry and free of substances that might impair bond between boards and walls.

3.2 INSTALLATION - GENERAL

- A. Keep perimeter lines straight, plumb, and level, and in plain of wall.
- B. Form straight joints, balanced symmetrically.
- D. Fit units accurately and neatly around projections and outlet boxes. Do all cutting of visual display boards for proper setting in trim.
- E. Roughen smooth surfaces and apply adhesive as directed by manufacturer's instructions.
- F. Install screws at panels as required to match spacing shown.
- G. Install mounting brackets for tackboards and cap with trim.
- H. Fit all frames and trim neatly and accurately and set all fastenings.

3.3 CLEANING AND PROTECTION

- A. Clean all units to original finish after installation.
- B. Mask boards where trimmed with wood to permit field finishing. Remove and clean after finishing.
- C. Protect entire installation until final acceptance by the Owner.

3.4 WASTE MANAGEMENT – Coordinate with Section 017419

- A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
- B. Set aside and protect materials suitable for reuse and/or remanufacturing.
- C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

End of Section

SECTION 101400 - IDENTIFYING DEVICES

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements govern work in this Section.

1.2 DESCRIPTION OF WORK

A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of the <u>signage and graphics work</u> for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:

<u>NOTE</u>: All signage proposed for the Work shall be "accessible design" signage in accordance with ANSI A117.1 and the "ADA" requirements promulgated by the acts of 2010.

- Provide interior graphics and signage systems throughout the project for areas scheduled and/or indicated on the drawings in accordance with attached description and as defined on the drawings and per schedule on A902. All type shall be produced from typeset type at least one half full size.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification.

1.4 QUALITY ASSURANCE

- A. Requirements given herein may be affected by other related requirements of the project specification. Correlation of contract requirements is the responsibility of the Contractor.
- B. The work of this Section shall be performed by a "Specialty Contractor" as defined in the General Conditions.
- C. In compliance with the SED Manual of Planning Standards, Part II, Section S202, all materials incorporated in the work of this Section shall comply with the following:
 - Class A, Flame Spread 0-25 interior finish shall be mandatory in corridors; passageways; stairs; exit ways; kitchens; maintenance, repair and custodial areas; trim/paneling systems in places of public assembly.
 - Class C, Flame Spread Less than 200 interior finish is mandatory in all instructional and office spaces.

In any case, regardless of the flame spread classification, no material having a smoke developed rating of 450 or more may be used in any area of work on this project.

- 1.5 SUBMITTALS Coordinate with Section 01 33 00
 - Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.

- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Shop and layout drawings of all signage systems to be employed in the work; including but not limited to style, spacing and method of securing.
- B. Samples of all signage systems to be employed in the work. Signage sample submitted shall be on actual background media intended. Samples to be submitted for construction quality, finish, graphic application, type face, layout and color match.
- C. Color panels of all materials to be incorporated in the work for Architect's selection.
- D. Material Safety Data Sheet (MSDS) must be submitted for each product.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 016100)

- A. Deliver materials to project site in manufacturer's original unopened protective packaging.
- B. Identify contents, manufacturer, brand name, and applicable standards.
- C. Handle so as to prevent damage.

1.7 COORDINATION

A. Furnish full-size spacing templates for individually bundled letters and numbers for coordination with work of other trades.

1.8 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

2.1 MATERIALS - GENERAL

- A. MELAMINE PLASTIC Material shall be "self-extinguishing" and furnished with a "life-of-building" warranty. Material shall be as manufactured Westinghouse, Wilson, General Electric or approved equal in thicknesses as required for intended use.
- B. ACRYLIC MATERIAL "Plexiglass G" by Rohm & Haas Co., Dupont, General Electric or approved equal in thicknesses as required for intended use.
- C. VINYL DIE CUT LETTERS/FILM opaque non-reflective vinyl film, 0.0035 inch minimum thickness, with pressure sensitive adhesive backing, suitable for exterior as well as interior applications.
 - 1. APCO, 388 Grant Street, SE, Atlanta, GA.
 - 2. ASI-Modulex, 4082 Glencoe Avenue, Marina del Ray, CA.
 - 3. Vomar Products Inc., 16641 Roscoe Place, Sepulveda, CA.

2.2 INTERIOR MELAMINE PLASTIC SIGNS

- A. System shall be similar and equal to "Series 200A, Radius Edge Series" by Mohawk Sign Systems using sand carved techniques to produce integral braille and raised copy as part of the assembly. Lettering shall be raised 1/32 inch (0.8mm) to meet ADA and A117.1 guidelines.
- B. All signs to have copy as shown on drawings and shall be square edge in configuration.

2.3 FASTENERS AND GLUES

- A. Silicone adhesive or double faced tape shall be used for interior plastic signs where shown on sign description and schedules and shall be compatible with specified plastic as recommended by the sign manufacturer.
- B. Screws and bolts for interior signs shall have tamperproof panhead, spannerheads (Note: One-way screws will not be acceptable) and shall be appropriate for the connection being made as follows:
 - 1. Sheet metal screws with expansion shields for connection into hollow metal doors.
 - 2. 2 inch minimum metal screw with expansion sleeves into tackboards (masonry or drywall beyond).
 - Wood screw with lead shields for solid core wood doors.
- C. Magnetic tape shall be provided for sign systems to be mounted on metal doors, partitions and other elements as may be indicated on the schedules and/or drawings.

2.4 OCCUPANCY SIGNS

- A. Frame for occupancy certificate, maximum occupancy and Building signs shall be of aluminum, stain finish, with one side of frame removable.
- B. For size of frames, see drawings, minimum 1/2 inch face width.
- C. Provide 1/4 inch plywood backing in the frames.
- D. Secure frames to walls using tamperproof devices suitable for intended substrate.
- E. Safety glazing shall be as specified in Section 088000.
- F. Text shall be red lettering on a white background and shall be as follows:

MAXIMUM	3 inches high, 3/4 inch stroke
OCCUPANCY	

NOT TO EXCEED	2 inches high, 1/2 inch stroke
XXX PERSONS	3 inches high, 3/4 inch stroke

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 PREPARATION

- A. Separate aluminum from dissimilar metal parts of anchors by a heavy coat of approved bituminous paint applied to the contact surfaces and allowed to dry before assembly.
- B. All surfaces to receive applied signage shall be clean and dry and of composition that will readily accept intended signage application.
- C. If composition does not readily accept or support signage report said problem with 24 hours to the Architect for resolution.

3.3 INSTALLATION - GENERAL

- A. Units shall be installed true to line and level by the manufacturer or his authorized representative in accordance with approved shop and layout drawings.
- B. Plastic signage shall be erected using materials and systems specified in Part 2 of this Section.
- C. Vinyl die cut letters shall be applied in accordance with manufacturer's recommendations and to configuration shown and/or scheduled.

3.4 CLEANUP AND PROTECTION

A. All debris resulting from construction operations will be removed daily and upon final completion, all operating parts will be cleaned and protection removed.

3.5 WASTE MANAGEMENT – Coordinate with Section 017419

- A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
- B. Set aside and protect materials suitable for reuse and/or remanufacturing.
- C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

End of Section

SECTION 102100 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements govern work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of toilet compartment work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - 1. Provide floor mounted, ceiling braced, polymer toilet compartment enclosures and doors regardless of elevations shown on drawings.

<u>NOTE</u> - All pilasters shall be of extended height to tie into ceiling above; provide shoe at top and bottom of each pilaster.

- 2. Provide grab bars in all handicapped compartments using material as specified herein.
- 3. Mirrors to be provided and installed by GC per Section 08 80 00.
- 4. GC to install hand dryers provided by Owner. GC to coordinate locations with Electrical Contractor in conjunction with plumbing and tilework.
- 5. GC to coordinate and install balance of toilet room accessories provided by Owner.
- 6. Provide wall mounted polymer urinal screens.

Note: Color as selected from full range of premium colors and designer colors.

- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. 06 10 00 Rough Carpentry
 - B. 08 80 00 Glass and Glazing
 - C. 09 30 00 Tile Work

1.4 QUALITY ASSURANCE

- A. The manufacturer of the work required under this Section must show that he is engaged in and has been manufacturing this type of work for a period of not less than 5 years.
- B. All work herein shall comply with the requirements set forth in the reference standards. The most restrictive shall apply.
 - 1. National Fire Protection Association 101 Life Safety Code 2011 Edition, Chapters 5 and 10.
 - 2. ANSI A117.1 Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
 - 3. International Code Council, International Building Code, 2006 Edition.
 - 4. Title 24, California Code of Regulations, Parts 2, 3, and 5.

- 5. ADA, Accessibility Guidelines for Buildings and Facilities, Federal Register Volume 56, Number 144, Rules and Regulations.
- 6. American Society for Testing and Materials Standards:
 - a. ASTM E 84-01 Standard Test Method for Surface Burning Characteristics of Building Material.
 - b. ASTM D 2794 Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
 - c. ASTM D 2197 Standard Test Method for Adhesion of Organic Coatings by Scrape Adhesion.
 - d. ASTM D 6578 Standard Practice for Determination of Graffiti Resistance.
- C. All polymer materials shall conform with New York State Code requirements, except a flame spread rating of not more than 200 and a smoke density rating of not less than 75 or a smoke developed rating of less than 450 may be approved.

1.5 SUBMITTALS – Coordinate with Section 013300

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- B. Shop drawings showing all plans, elevation and details and showing adjoining materials and fastenings.
- C. Color, construction, brackets and hardware samples. Color samples shall show entire range of stock
- D. Certification of specification compliance.
- E. The Contractor shall take all necessary field measurements prior to fabrication and installation work and shall assume complete responsibility for accuracy of same.
- F. Material Safety Data Sheet (MSDS) must be submitted for each product.

1.6 PERFORMANCE REQUIREMENTS

A. Graffiti Resistance: Partition material shall have the following graffiti removal characteristics when tested in accordance with ASTM D 6578-00 Standard Practice for Determination of Graffiti Resistance in accordance with Section 9, "Graffiti Removal Procedure Using Manual Solvent Rubs": Five (5) required staining agents shall be cleaned off material.

- B. Scratch Resistance: Partition material shall have the following characteristics when tested in accordance with ASTM D 2197-98(2002) Standard Test Method for Adhesion of Organic Coating by Scrape Adhesion, using Gardner Stock #PA-2197/ST pointed stylus attachment on scrape tester: Maximum Load Value shall exceed 10 kilograms.
- C. Impact Resistance: Partition material shall have the following characteristics when tested in accordance with ASTM D 2794-93(1999)e1 Standard Test Method for Resistance of Organic Coating to the Effects of Rapid Deformation (Impact), using .625" hemispherical indenter with 2-lb impact weight: Impact Resistance: Maximum Impact Force value shall exceed 30 inch-lbs.
- D. Fire Resistance: Partition material shall comply with the following requirements, when tested in accordance with ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:
 - 1. Smoke Developed Index: Not to exceed 450.
 - 2. Flame Spread Index: Not to exceed 75.
 - 3. Material Fire Ratings:
 - a. National Fire Protection Association (NFPA): Class B.
 - b. International Code Council (ICC): Class B.
- 1.7 SPECIAL GUARANTEE/WARRANTY TERMS Ten-year limited warranty for panels, doors, and stiles against breakage, corrosion, delamination, and defects in factory workmanship.

1.8 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 MANUFACTURE

- A. Toilet partitions, and/or screens shall be solid 1 inch thick plastic as manufactured by -
 - 1. Scranton Products Company, Scranton, PA
 - 2. Knickerbocker (Plastique SP)
 - 3. Global (HDPE)
 - PSISC/Columbia or approved equal.

2.2 HEIGHT ABOVE FINISHED FLOOR

A. Toilet Compartment - 70 inches unless otherwise shown; Pilasters, ceiling height.

2.3 MATERIALS

A. All materials, panels, doors, pilasters and the like shall be fabricated from polymer resins under high pressure forming a single component section that is waterproof, corrosion-proof, impact-resistant, and non-absorbent, and which has a self-lubricating protective plastic glaze coating over all surfaces that resists marking with pens, pencils, lipsticks, and other writing or marking implements.

2.4 CONSTRUCTION

A. All partitions shall be 1 inch thick, with all edges machined to a radius of 0.250 inches and all sharp corners removed. All pilasters shall be ceiling high and fastened to 3 inch high, 18 gauge stainless steel shoes at both top and bottom by means of theft-proof stainless steel sex bolts.

2.5 HARDWARE AND ACCESSORIES

- A. Each toilet compartment shall be complete with all hardware, door hinges, latch stop and keeper, and all necessary fittings and fastening for a complete installation.
- B. Door hardware:
 - 1. Hinge: Cast Stainless Steel Vault Type Hinge. Hinge shall be made of Type 304 Stainless Steel and shall have a Satin finish. Hinge shall be gravity type for self-closing action and shall be fully adjustable up to 360 degrees. Pivot pin shall operate on Stainless Steel Ball Bearings and a Nylon Cam. Hinges shall provide emergency access by lifting the door. Hinges shall be pre-drilled for mounting to door and pilaster with Stainless Steel Through-Bolts. Each Hinge is to be packaged in a separate carton, and is to be labeled by stock number, manufacturer, and left or right hand. Factory set hinges to a full close position unless otherwise noted on the drawings and/or directed by the Architect/Owner. On doors over 24 inches use a oversized outswing noted wrap-around hinge.
 - 2. Equip each door with 1 coat hook/bumper of heavy duty Stainless Steel with rubber bumper. Handicapped doors also include 1 door pull and 1 wall stop.
 - 3. Fabricate door strike and keeper from heavy aluminum extrusion (6063-T6 Alloy) with clear anodized finish with wrap around flange surface, mounted and thru-bolted to pilaster with one-way stainless steel sex bolts.
 - 4. Door latches integral latch with 3/8 inch stainless steel slide bolt. Provide emergency access provisions on all latches to handicapped compartments.
- C. Provide aluminum strip on bottom of all panels and doors.
- D. Mounting Brackets
 - Furnish full length continuous wall bracket (6063-T6 Alloy) with mill finish not less than 1.685 lbs. per linear foot for use for all panels to pilaster, pilaster to wall and panel to wall connections. Predrill wall brackets by manufacturer with holes spaced every 12 inches along full length of brackets.

2.6 GRAB BARS

- A. Furnish 1-1/4 inch nominal diameter grab bars in design configuration shown on abutting walls and within handicapped toilet stalls as indicated on drawing and in accordance with Details.
- B. Grab bars shall be fabricated of 18 gauge, Type 304 stainless steel tubing welded to 11 gauge flanges and protected by concealed 13 gauge stainless steel mounting plates. Finish – Satin; Approved Manufacturers: TSM; Bobrick; ASI; Parker.
- C. Grab bars, fasteners, and anchors shall be capable of sustaining a force of 250 pounds at any point and from any direction.
- D. Meet requirements of ANSI, latest edition, for "structural Strength" for grab bars. Provide 1-1/2 inch clearance between grab bar and wall surface.
- E. Coordinate with companion construction trades to insure that proper blocking supports are incorporated into partition construction.

<u>NOTE</u> - if toilet partition panels require additional reinforcement to sustain the design load specified above, manufacturer to provide.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

- A. Examine all surfaces and contiguous elements to receive work of this section <u>and correct</u>, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.
- B. Verify correct spacing and size of plumbing fixtures for compliance with ADA-AG as per Paragraph 1.03 herein.

3.2 ERECTION - GENERAL

- A. Arrangement of enclosures and sizes shall be as indicated on the drawings, and the work shall be laid out from actual dimensions at the site.
- B. Erect units in strict accordance with manufacturer's instructions and in accordance with approved shop drawings, so as to provide for a firm installation, straight and plumb, securely attached to floors, walls and ceilings and with all horizontal lines level.
- C. Attach brackets to adjacent wall construction through use of stainless steel expansion bolts <u>or</u> toggle type devices spaced at 12 inch intervals, staggered, along the full length of bracket depended upon substrates encountered.
- D. Through bolt wall brackets to panels and pilasters with one-way stainless steel sex bolts.
- E. Anchor dividing partition panels to pilaster stiles which shall be adequately reinforced to receive dividing partition panels.
- F. Clearances
 - 1. Provide clearances of not more than 1/2 inch between pilasters and panels, panels and walls, and not more than 1 inch between pilasters and walls.
 - 2. Clearance at vertical edges of doors shall be uniform from top to bottom and shall not exceed 3/16 inches. Doors shall be free of warps and bends.
- G. Conceal all evidence of drilling, cutting and fitting of the finish surfaces.

3.3 GRAB BAR INSTALLATION

- A. Install grab bars at heights above floor, and in locations related to plumbing fixtures as shown on the Drawings and in accordance with ANSI requirements.
- B. Install true and plumb.

3.4 PROTECTION

- A. Protect all adjacent work and finished surfaces from damage caused by the installation of the work of this Section.
- B. Damage caused by the handling, storing or installation of the work herein, or failure to provide adequate protection of surrounding areas shall be repaired or replaced at no additional cost to the Owner.

3.5 ACCEPTANCE AND CLEANUP

- A. After erection and until final acceptance of the buildings, protect all work from damage of any nature.
- B. Any part or parts damaged shall be replaced by the Contractor without cost to the Owner. Such replacements shall include adjacent work that may be incidentally damaged.
- C. All work shall be turned over to the Owner in a clean, properly installed, true to line and plumb condition.
- D. Adjust hardware and leave in perfect working order.
- E. Remove all protective masking and clean surfaces, leaving them free of soil and imperfection.
- F. Upon completion of work, all equipment, remaining material and rubbish resulting from the work of this section shall be removed from the premises.

3.6 WASTE MANAGEMENT – Coordinate with Section 01 74 19

- A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
- B. Set aside and protect materials suitable for reuse and/or remanufacturing.
- C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

End of Section

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SECTION 104400 - FIRE PROTECTION SPECIALTIES (Including Defibrillators)

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements govern work in this Section.

1.2 DESCRIPTION OF WORK

A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all <u>fire cabinets and extinguishers located as per code statement as well as one</u>
(1) AED device for the building located as directed by the Owner for this project.

Extinguishers shall be located so that no point in a corridor, lobby or stair is more than 75 feet from an extinguisher. Extinguishers shall also be placed readily accessible to mechanical/boiler rooms, kitchens, serveries, and accessible from other places which are possible sources of fire.

NOTES:

- Fire extinguishers shall be fully charged when building is accepted by Owner.
- Where cabinets are located in fire rated walls, provide "Fire-FX" option for cabinet construction.
- All extinguishers shall be U/L rated 2A-10BC.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. 042000 Unit Masonry
 - B. 092900 Gypsum Drywall
 - C. 099000 Field Painting

1.4 QUALITY ASSURANCE

- A. Conform to NFPA 10 requirements for portable fire extinguishers.
- B. Provide fire extinguishers, cabinets and accessories by a single manufacturer.
- C. Conform to UBC 43-6 (ASTM E 814-83) for fire resistive wall performance where necessary.
- D. Americans with Disabilities Act 1990- Maximum 4 cabinet projection for corridors.
- E. All materials incorporated in the work of this Section shall comply with the following:
 - 1. Class A, Flame Spread 0-25 interior finish shall be mandatory in corridors; passageways; stairs; exit ways; kitchens; maintenance, repair and custodial areas; trim/paneling systems in places of public assembly.
 - 2. Class C, Flame Spread Less than 200 interior finish is mandatory in all instructional and office spaces.

In any case, regardless of the flame spread classification, no material having a smoke developed rating of 450 or more may be used in any area of work on this project.

1.5 SUBMITTALS – Coordinate with Section 013300

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 013300 and 013200, prepare and submit a fully developed submittal schedule; note review times set forth in Section 013300 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 013114 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Shop drawings of all fabricated items showing complete construction details, erection requirements and fastenings.
- B. Full size samples of fabricated units to be incorporated in the work. Samples shall be incorporated as part of the contract obligations.
- C. Samples of all other materials required to complete the work.
- D. Certification of Specification Compliance.
- E. Where applicable, Contractor shall take all necessary <u>field measurements</u> prior to fabrication and shall assume complete responsibility for accuracy of same.
- F. Material Safety Data Sheet (MSDS) must be submitted for each product.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 016100)

- A. All materials shall be delivered to the job site in unopened factory sealed containers clearly labeled as to product, manufacturer, color and/or other pertinent characteristics.
- B. Materials shall be stored under conditions recommended by the manufacturer.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Units shall be as manufactured by J.L. Industries or equal by Potter Remmer or Larsons and shall be located as indicated on the drawings and/or in compliance with code statement in Part 1 above.
- B. Cabinets: J.L. Industries 1016-W18 and 1017-W18, finish to be electrostatic white epoxy primer finish.

2.2 FIRE EXTINGUISHERS

- A. Water Type: J.L. Industries Grenadier P
- B. Dry Chemical Type: J.L. Industries Cosmic or Galaxy Series
- C. Carbon Dioxide Type: J.L. Industries Sentinel Series.

2.3 ACCESSORIES

A. Extinguisher Brackets

Orange-Ulster BOCES
Interior Alterations – Third Floor
Regional Education Center at Arden Hill

B. Cabinet Alarms

2.4 AUTOMATED EXTERNAL DEFIBRILLATOR

A. Provide Zoll AED+Plus with Zoll one-piece CPR-D *padz* with CPR Feedback, Batteries, Carry case, 5 year warranty.

2.5 TRAINING UNIT

A. Provide Zoll AED+Plus training unit with trainer remote control, AC Adapter, hand held cord, and operator manual.

2.6 AED CABINET

A. Semi-recessed wall cabinet with strobe/alarm similar to model AMP180-14RRM by AED Superstore. Wall-mounted strobe/alarm is similar to part AMP180-14RRM.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.
 - Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.
 - 2. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.

3.2 CLEANUP AND PROTECTION

- A. Protect all adjacent work and finished surfaces from damage caused by the installation of the work of this Section.
- B. Damage caused by the handling, storing or installation of the work herein, or failure to provide adequate protection of surrounding areas shall be repaired or replaced at no additional cost to the Owner.
- C. All debris resulting from construction operations will be removed daily and upon final completion, all operating parts will be cleaned and protection removed.

3.3 WASTE MANAGEMENT – Coordinate with Section 017419

- A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
- B. Set aside and protect materials suitable for reuse and/or remanufacturing.
- C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

End of Section

SECTION 122000 - WINDOW TREATMENTS

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements govern work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of the window treatment work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - 1. Provide pull-down window (solar) shades at all exterior windows, complete with brackets, supports and the like as required by the installation.
 - 2. Coordinate with Section 061000 for concealed blocking for blinds and Sections 092900 and 095100 for finished ceiling work.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above.

1.4 QUALITY ASSURANCE

- A. Requirements given herein may be affected by other related requirements of the project specification. Correlation of said requirements is the responsibility of the Contractor.
- B. Manufacturers of products shall have a minimum of 5 years experience in the production of products specified.
- C. Manufacturer shall be a single source of units including hardware, accessories, mounting brackets and fastenings.
- D. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- E. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.
- F. Mockup: Provide a mockup of one roller assembly for evaluation of mounting, appearance and accessories. Locate mockup in window designated by Architect. Do not proceed with remaining work until, mockup is accepted by Architect.

1.5 SUBMITTALS – Coordinate with Section 01 33 00

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 013300 and 013200, prepare and submit a fully developed submittal schedule; note review times set forth in Section 013300 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 013114 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".

- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods.
- B. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances and relationship to adjacent work.
- C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.
- D. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.
- E. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware.
- F. Certification of Specification Compliance.
- G. Material Safety Data Sheet (MSDS) must be submitted for each product.

1.6 REFERENCES

- A. ASTM G 21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- B. NFPA 701-99 Fire Tests for Flame-Resistant Textiles and Films.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Install all window treatments shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.9 WARRANTY

A. Roller Shade Hardware, Chain and Shadecloth: Manufacturer's standard non-depreciating twenty-five year limited warranty.

1.10 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - Water based.

- 2. Water-soluble.
- 3. Can be cleaned up with water.
- 4. Non-flammable.
- 5. Biodegradable.
- 6. Low or preferably no Volatile Organic Compound (VOC) content.
- 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
- 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
- 9. Do not contain methylene-chloride.
- 10. Do not contain chlorinated hydrocarbons.
- 11. Contains the least possible of post-consumer or post-industrial waste.

PART 2 - PRODUCTS

2.1 SHADE SYSTEMS

- A. The work of this project and specifically the window treatments are based on the products of MechoShade Systems, Inc., 42-03 35th Street; Long Island City, NY 11101; Tel: (718) 729-2020; Fax: (718) 729-2941; Email: info@mechoshade.com
 - 1. Shade 1: EcoVeil 1350 Series (3% Density), color: TBD.

2.2 SHADE BAND

- A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
 - 1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
 - 2. Shade band and Shade Roller Attachment:
 - a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch (39.37 mm) in diameter for manual shades, and less than 2.55 inches (64.77 mm) for motorize shades are not acceptable.
 - b. Provide for positive mechanical engagement with drive/brake mechanism.
 - c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable/replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
 - d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
 - e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.3 SHADE FABRICATION

- A. Fabricate units to completely fill existing openings from head to sill and jamb-tojamb, unless specifically indicated otherwise.
- B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:
 - 1. Bottom hem weights for solar shades
- C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.
- D. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.
- E. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.
- F. Battens shall be roll formed of stainless steel or tempered steel and concave to match the contour of the roller tube.
- G. Batten pockets shall be self-colored fabric front and back RF welded into the shadecloth. A self-color opaque liner shall be provided front and back to eliminate any see through of the batten pocket that shall not exceed 1-1/2 inches (38.1 mm) high and be totally opaque. A see-through moiré effect, which occurs with multiple layers of transparent fabrics, shall not be acceptable.

2.4 COMPONENTS

- A. Access and Material Requirements:
 - 1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
 - 2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
 - 3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and/or polyester, or reinforced polyester will not be acceptable.

2.5 ACCESSORIES

A. Provide, as part of the work of Section 095100, either extruded aluminum and or formed steel shade pocket, sized to accommodate roller shades, with exposed

extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.

B. Fascias:

- 1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
- 2. Fascia shall be able to be installed across two or more shade bands in one piece.
- 3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
- 4. Provide bracket/fascia end caps where mounting conditions expose outside of roller shade brackets.
- 5. Notching of Fascia for manual chain shall not be acceptable.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 INSTALLATION - GENERAL

- A. Install units true to line and level by the manufacturer or his authorized representative in accordance with manufacturer's installation procedures and the approved shop drawings. All fasteners shall be concealed.
- B. Assure adequate clearance to permit unencumbered operations.

3.3 ADJUSTMENT, REPAIR AND REPLACEMENT

- A. All operating units shall be adjusted and left in perfect working order.
- B. Replace damaged items with new materials.
- Repair adjacent surfaces damaged by improper installation to the satisfaction of the Architect.

3.4 CLEANUP AND PROTECTION

- A. Remove protective covering and devices.
- B. All debris resulting from construction operations will be removed daily and upon final completion, all operating parts will be cleaned and protection removed.

3.5 WASTE MANAGEMENT – Coordinate with Section 017419

- A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
- B. Set aside and protect materials suitable for reuse and/or remanufacturing.
- C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

End of Section

SECTION 210500 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

- A. The installation of the complete, operational and tested automatic fire sprinkler system, including head locations, pipe, fittings, valves, connections, risers, building piping, site piping between the fire riser and the building, shall be performed by Contractors currently experienced in this work and having five continuous years of experience herein. The Contractor shall furnish shop drawings based on this Engineer's permitted Bid Documents. These shop drawings shall include additional information to include, but not be limited to, hydraulic calculations, delegated design calculations, dimensional information, elevations, elevation rises and drops, and adjustments necessary to coordinate the fire sprinkler piping with the building, building structure and equipment/materials of other trades.
- B. Fire Sprinkler Contractor shall review the information contained herein and shall prepare complete fire system installation shop drawings coinciding with hydraulic calculations sealed by a New York State Registered Professional Engineer experienced in the field. The Fire Protection Contractor shall be required to provide detailed fire protection construction drawings to be signed and sealed by a New York State Register Professional Engineer. The design and details shall conform to NFPA 13, and all local codes and regulations. These documents shall be considered the Fire Protection System Engineering Documents. Copies of signed and sealed construction drawings shall be submitted for review and comment. When approval is achieved, the Contractor shall submit the necessary number of copies of signed and sealed drawings to Authorities Having Jurisdiction for review and approval.
- C. The intent for the design and installation for the automatic fire sprinkler is to be fully sprinklered within the spaces noted on the drawings. Any exceptions to this shall be approved in writing (prior to submission of permit drawings) by the Authority Having Jurisdiction.
- D. This Contractor's shop drawings shall be coordinated with ceilings, air devices, lighting, structural members, etc. The Contractor shall align the sprinkler heads within the center of ceiling tiles. All sprinkler heads in rooms with ceilings shall be concealed type (unless otherwise noted). Any sprinkler heads shown on the performance criteria drawings are to indicate design intent. The Contractor's shop drawings shall be required to comply with the design intent. In certain areas it may be required to install more heads that required by code minimum in order to achieve the ceiling symmetry established in the design intent drawings.
- E. Prior to commencing work, the contractor shall perform a hydrant flow test. During construction, the Contractor shall furnish a new flow test at any time during the construction of the project if requested in writing by the Authority Having Jurisdiction and/or Engineer of Record.

1.3 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Mechanical sleeve seals.
 - 3. Sleeves.
 - 4. Escutcheons.
 - 6. Equipment installation requirements common to equipment sections.
 - 7. Painting and finishing.
 - 8. Supports and anchorages.
 - 9. Concrete bases.
 - 10. Grout.

1.4 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Mechanical sleeve seals.
 - 2. Escutcheons.
- B. Welding certificates.
- C. New York State Registered Professional Engineer documentation.

1.6 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for Fire-Suppression Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

1.8 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for fire-suppression installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-inplace concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for fire-suppression items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

1.9 CLOSE-OUT DOCUMENTS

- A. This Contractor shall furnish Operating and Maintenance (O&M) manuals and Asbuilt drawings before final payment will be issued.
 - 1. O&M manuals shall be submitted in accordance with Division 1, General Requirements, and shall consist of the following (at a minimum):
 - a. All Contractor and Manufacturer warranties.
 - b. List of Contractors and Parts and Equipment Suppliers—complete with contact person, proper company name, address, and telephone numbers.
 - c. Parts list for supplied equipment—including a checklist of recommended components to be stocked on-site.
 - d. Maintenance and replacement parts manuals.
 - e. Start-up and shutdown operating instructions.
 - f. Manufacturer's literature describing the equipment, which shall include wiring diagrams and operating specifications.
 - g. Control system sequence of operation, system diagram, and backup disks of the system configuration.
 - h. Sign-in sheet for Owner's training.
 - 2. List of attic stock signed for by Owner;
 - 3. Fire hydrant flow test report.
 - 4. Sign-in sheet for training and training video, as required;
 - 5. Electronic copy of Close-Out Documents saved in PDF format on flash drive.
 - 6. The Contractor shall provide AutoCAD as-built drawings and copies of each AutoCAD file on CD before final payment will be issued.
 - 7. Approval letters from Authority Having Jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.
 - 2. REFER TO SCHEDULES AND EQUIPMENT NOTES ON DRAWINGS FOR BASIS OF DESIGN MATERIALS, MANUFACTURERS, AND MODEL NUMBERS.

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 21 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 21 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - 1. Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 3. Pressure Plates: Galvanized Steel or Stainless Steel Include two for each sealing element.
 - 4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating or Stainless Steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - 1. Underdeck Clamp: Clamping ring with set screws.

2.6 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Cast-Brass Type: With set screw.
 - 1. Finish: Polished chrome-plated.
- C. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
 - 1. Finish: Polished chrome-plated.
- D. One-Piece, Floor-Plate Type: Cast-iron floor plate.
- E. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.7 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

- 3.1 PIPING SYSTEMS—COMMON REQUIREMENTS
 - A. Install piping according to the following requirements and Division 21 Sections specifying piping systems.
 - B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
 - C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
 - D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
 - E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
 - F. Install piping to permit valve servicing.
 - G. Install piping at indicated slopes.
 - H. Install piping free of sags and bends.
 - I. Install fittings for changes in direction and branch connections.
 - J. Install piping to allow application of insulation (where applicable).
 - K. Select system components with pressure rating equal to or greater than system operating pressure.
 - L. Install escutcheons for penetrations of walls, ceilings, and floors.
 - N. Install sleeves for pipes passing through concrete and masonry walls, gypsumboard partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2" (two inches) above finished

floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

- 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
- 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to two inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
- 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- O. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Install steel pipe for sleeves.
 - 2. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- Q. Verify final equipment locations for roughing-in.
- R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 21 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.3 PAINTING

- A. Painting of fire-suppression systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting." All exposed riser and branch piping in finished and unfinished rooms shall be painted Red.
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.4 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.
- B. Field Welding: Comply with AWS D1.1.

3.5 GROUTING

- A. Mix and install grout for fire-suppression equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 210500

SECTION 210517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Grout.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.2 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- C. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.

- 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 Section "Joint Sealants."
- D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.2 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves for the following piping-penetration applications:
 - 1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than NPS 6: Cast-iron wall sleeves.
 - b. Piping NPS 6 and Larger: Cast-iron wall sleeves.
 - 2. Concrete Slabs-on-Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - 3. Interior Partitions:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
 - b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.

END OF SECTION 210517

SECTION 210518 - ESCUTCHEONS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
- B. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - c. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - d. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type.
 - e. Bare Piping in Equipment Rooms: One-piece, stamped-steel type.
- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping: One-piece, floor-plate type.

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3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 210518

SECTION 210529 - HANGERS AND SUPPORTS FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Fastener systems.
 - 4. Equipment supports.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze pipe hangers.
 - 2. Equipment supports.
- C. Delegated-Design Submittal: For trapeze hangers 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. Detail fabrication and assembly of trapeze hangers.
 - 2. Include design calculations for designing trapeze hangers.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.
- B. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Hangers and supports for fire-suppression piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- B. NFPA Compliance: Comply with NFPA 13.
- C. UL Compliance: Comply with UL 203.

2.2 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: Factory-fabricated components, NFPA approved, UL listed, or FM approved for fire-suppression piping support.
 - 2. Galvanized Metallic Coatings: Pregalvanized or hot-dip galvanized.
 - 3. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly, made from structural-carbon-steel shapes, with NFPA-approved, ULlisted, or FM-approved carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: NFPA-approved, UL-listed, or FM-approved threaded-steel stud, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: NFPA-approved, UL-listed, or FM-approved, insert-wedge-type anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 - 1. Indoor Applications: Zinc-coated steel.
 - 2. Outdoor Applications: Stainless steel.

2.5 EQUIPMENT SUPPORTS

A. Description: NFPA-approved, UL-listed, or FM-approved, welded, shop- or field-fabricated equipment support, made from structural-carbon-steel shapes.

2.6 MATERIALS

A. Aluminum: ASTM B221

B. Carbon Steel: ASTM A1011/A1011M.

- C. Structural Steel: ASTM A36/A36M, carbon-steel plates, shapes, and bars; black and galvanized.
- D. Stainless Steel: ASTM A240/A240M.
- E. Grout: ASTM C1107/C1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout, suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

3.2 INSTALLATION OF HANGERS AND SUPPORTS

- A. Metal Pipe-Hanger Installation: Comply with installation requirements of approvals and listings. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size, or install intermediate supports for smaller-diameter pipes as specified for individual pipe hangers.
 - 2. Field fabricate from ASTM A36/A36M carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual. Install in accordance with approvals and listings.
 - 2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions. Install in accordance with approvals and listings.
- D. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- E. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- F. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

- G. Install lateral bracing with pipe hangers and supports to prevent swaying.
- H. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms, and install reinforcing bars through openings at top of inserts.
- I. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- J.Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

3.3 INSTALLATION OF EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment, and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and 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. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

- A. Touchup:
 - 1. Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

- a. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A780/A780M.

3.7 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with NFPA requirements for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finishes.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.
- F. Horizontal-Piping Hangers and Supports: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
 - 2. Steel Pipe Clamps (MSS Type 4): For suspension of NPS 1/2 to NPS if little or no insulation is required.
 - 3. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 4. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
 - 5. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
 - 6. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
 - 7. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36 with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate
 - 8. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 - 9. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
- G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
 - 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
 - 3. Hanger-Rod Attachments: Comply with NFPA requirements.
- H. Building Attachments: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:

- 1. Steel or Malleable-Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
- 2. C-Clamps (MSS Type 23): For structural shapes.
- 3. Side-Beam Brackets (MSS Type 34): For sides of steel beams.
- I. Saddles and Shields: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 - 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 - 3. Thermal Hanger-Shield Inserts: For supporting insulated pipe.
- J.Comply with NFPA requirements for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- K. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 210529

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 **SUMMARY**

- Section Includes:
 - 1. Pipes, fittings, and specialties.
 - 2. Fire-protection valves.
 - 3. Sprinklers.
 - 4. Alarm devices.
 - 5. Pressure gages.
- Related Sections: B.
 - 1. Division 21 Section "Hangers and Supports for Fire-Suppression Piping and Equipment".

1.3 **DEFINITIONS**

Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.

1.4 SYSTEM DESCRIPTIONS

Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. connections are included if indicated.

1.5 PERFORMANCE REQUIREMENTS

- Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- B. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer licensed in New York State, using performance requirements and design criteria indicated.
- Sprinkler system design shall be approved by authorities having jurisdiction.
 - 1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water service piping, valves, and backflow preventers.
 - 2. Sprinkler Occupancy Hazard Classifications:
 - a. Refer to drawings.
 - 3. Minimum Density for Automatic Sprinkler and Deluge Sprinkler Piping Design:
 - a. Revise first seven subparagraphs below to suit requirements of authorities having jurisdiction. Values indicated should provide minimum required total flow for each hazard and group.
 - b. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.

- c. Refer to drawings for additional information.
- 4. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:
 - a. Light-Hazard Occupancies: 100 gpm for 30 minutes.

1.6 **SUBMITTALS**

- Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in New York State responsible for their preparation.
- D. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Domestic water piping.
 - 2. HVAC hydronic piping.
 - 3. HVAC ductwork.
 - 4. Items penetrating finished ceiling include the following:
 - a. Lighting fixtures.
 - b. Speakers.
 - c. Fire alarm system devices.
 - d. Air outlets and inlets.
- Approved Sprinkler Piping Drawings: Working plans, prepared according to E. NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable. Working plans and hydraulic calculations shall be signed and sealed by a qualified professional engineer licensed in New York State.
- F. Welding certificates.
- Qualification Data: For qualified Installer and professional engineer.
- Fire-hydrant flow test report. Hydrant flow test shall be performed by the contractor as part of their work.
- I. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
- J. Field quality-control reports.
- Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.7 **QUALITY ASSURANCE**

- Installer Qualifications:
 - 1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of firehydrant flow test.

- a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer licensed in New York State.
- B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13, "Installation of Sprinkler Systems."

1.8 COORDINATION

A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, speakers, fire alarm system devices, HVAC equipment, and partition assemblies.

1.9 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

2.2 STEEL PIPE AND FITTINGS

- A. Steel pipes in this article are arranged in order of decreasing wall thickness.
- B. All steel piping in this article is suitable for 175-psig (1200-kPa) minimum working pressure.
- C. Standard Weight, Galvanized- and Black-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.
- D. Schedule 10, Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10, plain end.
- E. Nipples in first paragraph below are available in NPS 1/8 to NPS 12 (DN 6 to DN 300).
- F. Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- G. Couplings in first paragraph below are available in NPS 1/8 to NPS 20 (DN 6 to DN 500).
- H. Galvanized and Uncoated, Steel Couplings: ASTM A 865, threaded.

- I. Galvanized and Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- J. Malleable- or Ductile-Iron Unions: UL 860.
- K. Cast-Iron Flanges: ASME 16.1, Class 125.
- L. Flanges and fittings in first paragraph below are available in NPS 1/2 to NPS 24 (DN 15 to DN 600).
- M. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
- N. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.
- O. Grooved-Joint, Steel-Pipe Appurtenances:
 - 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. Anvil International, Inc.
 - b. Corcoran Piping System Co.
 - c. National Fittings, Inc.
 - d. Shurjoint Piping Products.
 - e. Tyco Fire & Building Products LP.
 - f. Victaulic Company.
 - 2. Pressure Rating: 175 psig minimum.
 - 3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.3 DUCTILE IRON PIPE AND FITTINGS

- A. Water Pipe: Bitumin coated and cement-mortar lined; AWWA C151, with mechanical-joint bell and plain spigot end. Standard-pattern, mechanical-joint fittings: AWWA C110, ductile or gray iron.
 - 1. 3 and 4 Inch Sizes: Class 51
 - 2. 6 inch Size and over: Class 50

2.4 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free.
 - 1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
 - 2. Class 250, Cast-Iron Flanges and Class 300, Steel Raised-Face Flanges: Ring-type gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.5 LISTED FIRE-PROTECTION VALVES

- A. General Requirements:
 - 1. Valves shall be UL listed or FM approved.
 - 2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig.
- B. Ball Valves:
 - 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. Anvil International, Inc.
- b. Victaulic Company.
- 2. Standard: UL 1091 except with ball instead of disc.
- 3. Valves NPS 1-1/2 and Smaller: Bronze body with threaded ends.
- 4. Valves NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.
- C. Valves in first paragraph below are available in NPS 2-1/2 (DN 65) and smaller.
- D. Iron Butterfly Valves:
 - 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. Anvil International, Inc.
 - b. Fivalco Inc.
 - c. Global Safety Products, Inc.
 - d. Kennedy Valve; a division of McWane, Inc.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Pratt, Henry Company.
 - h. Shurjoint Piping Products.
 - i. Tyco Fire & Building Products LP.
 - j. Victaulic Company.
 - 2. Standard: UL 1091.
 - 3. Pressure Rating: 175 psig.
 - 4. Body Material: Cast or ductile iron.
 - 5. Style: Lug or wafer.
 - 6. End Connections: Grooved.
- E. Check Valves:
 - 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. Anvil International, Inc.
 - b. Clow Valve Company; a division of McWane, Inc.
 - c. Crane Co.; Crane Valve Group; Crane Valves.
 - d. Crane Co.; Crane Valve Group; Jenkins Valves.
 - e. Crane Co.; Crane Valve Group; Stockham Division.
 - f. Kennedy Valve; a division of McWane, Inc.
 - g. Milwaukee Valve Company.
 - h. Mueller Co.; Water Products Division.
 - i. NIBCO INC.
 - j. Potter Roemer.
 - k. Reliable Automatic Sprinkler Co., Inc.
 - I. Tyco Fire & Building Products LP.
 - m. Victaulic Company.
 - n. Viking Corporation.
 - o. Watts Water Technologies, Inc.
 - 2. Standard: UL 312.
 - 3. Pressure Rating: 250 psig minimum.
 - 4. Type: Swing check.
 - 5. Body Material: Cast iron.
 - 6. End Connections: Flanged or grooved.

F. Indicating-Type Butterfly Valves:

- 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. Anvil International, Inc.
 - b Fivalco Inc
 - c. Global Safety Products, Inc.
 - d. Kennedy Valve; a division of McWane, Inc.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Shurjoint Piping Products.
 - h. Tyco Fire & Building Products LP.
 - i. Victaulic Company.
- 2. Standard: UL 1091.
- 3. Pressure Rating: 175 psig minimum.
- 4. Valves NPS 2 and Smaller:
 - a. Valve Type: Ball or butterfly.
 - b. Body Material: Bronze.
 - c. End Connections: Threaded.
- 5. Valves NPS 2-1/2 and Larger:
 - a. Valve Type: Butterfly.
 - b. Body Material: Cast or ductile iron.
 - c. End Connections: Flanged, grooved, or wafer.
- 6. Valve Operation: Integral electrical, 115-V ac, prewired, single-circuit, supervisory switch indicating device.

2.6 TRIM AND DRAIN VALVES

- A. General Requirements:
 - 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 2. Pressure Rating: 175 psig minimum.
- B. Angle Valves:
 - 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. Fire Protection Products, Inc.
 - b. United Brass Works, Inc.
- C. Ball Valves:
 - 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. Anvil International, Inc.
 - b. Barnett.
 - c. Conbraco Industries, Inc.; Apollo Valves.
 - d. Legend Valve.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Tyco Fire & Building Products LP.
 - h. Victaulic Company.
 - i. Watts Water Technologies, Inc.

2.7 SPRINKLER SPECIALTY PIPE FITTINGS

- Branch Outlet Fittings:
 - 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. Anvil International, Inc.
 - b. National Fittings, Inc.
 - c. Shurjoint Piping Products.
 - d. Tyco Fire & Building Products LP.
 - e. Victaulic Company.
 - 2. Standard: UL 213.
 - 3. Pressure Rating: 175 psig minimum.
 - 4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
 - 5. Type: Mechanical-T and -cross fittings.
 - 6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
 - 7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
 - 8. Branch Outlets: Grooved, plain-end pipe, or threaded.
- Flow Detection and Test Assemblies: B.
 - Subject to compliance with requirements, available 1. Manufacturers: manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGF Manufacturing Inc.
 - b. Reliable Automatic Sprinkler Co., Inc.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 - 2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 3. Pressure Rating: 175 psig minimum.
 - 4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
 - 5. Size: Same as connected piping.
 - 6. Inlet and Outlet: Threaded.
- Branch Line Testers:
 - 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. Elkhart Brass Mfg. Company, Inc.
 - b. Fire-End & Croker Corporation.
 - c. Potter Roemer.
 - 2. Standard: UL 199.
 - 3. Pressure Rating: 175 psig.
 - 4. Body Material: Brass.
 - 5. Size: Same as connected piping.
 - 6. Inlet: Threaded.
 - 7. Drain Outlet: Threaded and capped.
 - 8. Branch Outlet: Threaded, for sprinkler.
- Sprinkler Inspector's Test Fittings: D.

- 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. AGF Manufacturing Inc.
 - b. Triple R Specialty.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 - e. Viking Corporation.
- 2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
- 3. Pressure Rating: 175 psig minimum.
- 4. Body Material: Cast- or ductile-iron housing with sight glass.
- 5. Size: Same as connected piping.
- 6. Inlet and Outlet: Threaded.
- E. Adjustable Drop Nipples:
 - 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. CECA, LLC.
 - b. Corcoran Piping System Co.
 - c. Merit Manufacturing; a division of Anvil International, Inc.
 - 2. Standard: UL 1474.
 - 3. Pressure Rating: 250 psig minimum.
 - 4. Body Material: Steel pipe with EPDM-rubber O-ring seals.
 - 5. Size: Same as connected piping.
 - 6. Length: Adjustable.
 - 7. Inlet and Outlet: Threaded.
- F. Flexible, Sprinkler Hose Fittings:
 - 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. Fivalco Inc.
 - b. FlexHead Industries, Inc.
 - c. Gateway Tubing, Inc.
 - 2. Standard: UL 1474.
 - 3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
 - 4. Pressure Rating: 175 psig minimum.
 - 5. Size: Same as connected piping, for sprinkler.

2.8 SPRINKLERS

- 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. Reliable Automatic Sprinkler Co., Inc.
 - 2. Tyco Fire & Building Products LP.
 - 3. Viking Corporation.
- B. General Requirements:
 - 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.

- 2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.
- 3. Refer to schedule on drawings for sprinkler types.
- C. Automatic Sprinklers with Heat-Responsive Element:
 - 1. Nonresidential Applications: UL 199.
 - 2. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
 - 3. Refer to schedule on drawings for additional information.
- D. Sprinkler Finishes:
 - 1. Chrome plated.
 - 2. Bronze.
 - 3. Painted.
 - 4. Refer to schedule on drawings for additional information.
- E. Special Coatings:
 - 1. Wax.
 - 2. Lead.
 - 3. Corrosion-resistant paint.
 - 4. Refer to schedule on drawings for additional information.
- F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
 - 1. Ceiling Mounting: Chrome-plated steel, one piece, flat.
 - 2. Sidewall Mounting: Chrome-plated steel, one piece, flat.
- G. Sprinkler Guards:
 - 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. Reliable Automatic Sprinkler Co., Inc.
 - b. Tyco Fire & Building Products LP.
 - c. Victaulic Company.
 - d. Viking Corporation.
- 2. Standard: UL 199.
- 3. Type: Wire cage with fastening device for attaching to sprinkler.

2.9 ALARM DEVICES

- A. Alarm-device types shall match piping and equipment connections.
- B. Water-Flow Indicators:
 - 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. McDonnell & Miller; ITT Industries.
 - b. Potter Electric Signal Company.
 - c. System Sensor; a Honeywell company.
 - d. Viking Corporation.
 - 2. Standard: UL 346.
 - 3. Water-Flow Detector: Electrically supervised.
 - 4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete

with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.

- 5. Type: Paddle operated.
- 6. Pressure Rating: 250 psig.
- 7. Design Installation: Horizontal or vertical.
- C. Valve Supervisory Switches:
 - 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. Fire-Lite Alarms, Inc.; a Honeywell company.
 - b. Kennedy Valve; a division of McWane, Inc.
 - c. Potter Electric Signal Company.
 - d. System Sensor; a Honeywell company.
 - 2. Standard: UL 346.
 - 3. Type: Electrically supervised.
 - 4. Components: Single-pole, double-throw switch with normally closed contacts.
 - 5. Design: Signals that controlled valve is in other than fully open position.
- Indicator-Post Supervisory Switches: D.
 - Subject to compliance with requirements, available 1. Manufacturers: manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Potter Electric Signal Company.
 - b. System Sensor; a Honeywell company.
 - 2. Standard: UL 346.
 - 3. Type: Electrically supervised.
 - Single-pole, double-throw switch with normally closed 4. Components: contacts.
 - 5. Design: Signals that controlled indicator-post valve is in other than fully open position.

2.10 PRESSURE GAGES

- 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. AMETEK; U.S. Gauge Division.
 - b. Ashcroft, Inc.
 - c. Brecco Corporation.
 - d. WIKA Instrument Corporation.
- 2. Standard: UL 393.
- 3. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- 4. Pressure Gage Range: 0 to 250 psig minimum.
- 5. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.1 **PREPARATION**

Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

B. Report test results promptly and in writing.

3.2 WATER-SUPPLY CONNECTIONS

Connect sprinkler piping to building's interior water-distribution piping.

3.3 PIPING INSTALLATION

- Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
- B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.
- C. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- Install unions adjacent to each valve in pipes NPS 2 and smaller. D.
- Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- F. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- G. Install sprinkler piping with drains for complete system drainage.
- Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- I. Install alarm devices in piping systems.
- Install hangers and supports for sprinkler system piping according to NFPA 13. J. Comply with requirements for hanger materials in NFPA 13.
- K. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- L. Fill sprinkler system piping with water.
- Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 21 Section "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- N. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 21 Section "Escutcheons for Fire-Suppression Piping."

3.4 JOINT CONSTRUCTION

- Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- Welded Joints: Construct joints according to AWS D10.12M/D10.12, using Н. qualified processes and welding operators according to "Quality Assurance"
 - 1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
- I. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
- Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe J. according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- Dissimilar-Material Piping Joints: Make joints using adapters compatible with K. materials of both piping systems.
- Mechanical Joint: Make up joint in conformance with the manufacturer's printed L. installation instructions, with particular reference to tightening of bolts.

3.5 VALVE AND SPECIALTIES INSTALLATION

- Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having iurisdiction.
- Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

3.6 SPRINKLER INSTALLATION

- Install sprinklers in suspended ceilings in center of acoustical ceiling panels.
- Install sprinklers into flexible, sprinkler hose fittings and install hose into bracket B. on ceiling grid.

3.7 **IDENTIFICATION**

- Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Start and run excess-pressure pumps.
 - 6. Coordinate with fire-alarm tests. Operate as required.
 - 7. Verify that equipment hose threads are same as local fire-department equipment.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.9 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.

3.10 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

3.11 PIPING SCHEDULE

- A. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- B. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller, shall be the following:
 - 1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
- C. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 to NPS 6, shall be one of the following:
 - 1. Schedule 10, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - 2. Schedule 10, black-steel pipe with plain ends; welding fittings; and welded joints.

END OF SECTION 211313

SECTION 220511 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

- A. The requirements of this Section shall apply to all sections of Division 22.
- B. Definitions:
 - 1. Exposed: Piping and equipment exposed to view in finished rooms.
- C. Abbreviations/Acronyms:
 - 1. CWP: Cold Working Pressure
 - 2. DWV: Drainage, Waste and Vent
 - 3. FD: Floor Drain
 - 4. HOA: Hands-Off-Automatic
 - 5. HP: Horsepower
 - 6. NPS: Nominal Pipe Size
 - 7. NPT: National Pipe Thread
 - 8. OS&Y: Outside Stem and Yoke
 - 9. WOG: Water, Oil, Gas

1.3 APPLICABLE PUBLICATIONS

- A. The publications listed below shall form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society of Mechanical Engineers (ASME):

ASME Boiler and Pressure Vessel Code -

BPVC Section IX-2013 Welding, Brazing, and Fusing Qualifications B31.1-2012...... Power Piping

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

A36/A36M-2012 Standard Specification for Carbon Structural Steel

A575-96(R2013)e1.....Standard Specification for Steel Bars, Carbon, Merchant

Quality, M-Grades

E84-2013a..... Standard Test Method for Surface Burning Characteristics of

Building Materials

E119-2012a..... Standard Test Methods for Fire Tests of Building

Construction and Materials

D. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc:

Manufacture, Selection, Application and Installation

SP-69-2003 Pipe Hangers and Supports - Selection and Application

E. National Electrical Manufacturers Association (NEMA):

MG 1-2011 Motors and Generators

F. National Fire Protection Association (NFPA):

51B-2014......Standard for Fire Prevention During Welding, Cutting and

Other Hot Work

54-2012National Fuel Gas Code	
70-2011 National Electrical Code (NEC)	
G. NSF International (NSF):	
5-2012 Water Heaters, Hot Water Supply Boilers, and He	at
Recovery Equipment	
14-2012 Plastic Piping System Components and Related M	/laterials
61-2012 Drinking Water System Components – Health Effe	
372-2011 Drinking Water System Components – Lead Cont	ent

1.4 SUBMITTALS

- A. Submittals, including number of required copies, shall be submitted in accordance with Division 01 General Requirements.
- B. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements and will fit the space available.
- C. If equipment is submitted which differs in arrangement from that shown, provide drawings that show the rearrangement of all associated systems. Approval will be given only if all features of the equipment and associated systems, including accessibility, are equivalent to that required by the contract.
- D. Manufacturer's Literature and Data: Manufacturer's literature shall be submitted under the pertinent section rather than under this section.
 - 1. Electric motor data and variable speed drive data shall be submitted with the driven equipment.
 - 2. Equipment and materials identification.
 - 3. Firestopping materials.
 - 4. Hangers, inserts, supports and bracing. Provide load calculations for variable spring and constant support hangers.
 - 5. Wall, floor, and ceiling plates.
- E. Submittals and shop drawings for interdependent items, containing applicable descriptive information, shall be furnished together and complete in a group. Coordinate and properly integrate materials and equipment in each group to provide a completely compatible and efficient installation. Final review and approvals will be made only by groups.
- F. Coordination Drawings: Complete consolidated and coordinated layout drawings shall be submitted for all new systems, and for existing systems that are in the same areas. The drawings shall include plan views, elevations and sections of all systems and shall be on a scale of not less than 3/8 inch equal to one foot. Clearly identify and dimension the proposed locations of the principal items of equipment. The drawings shall clearly show the proposed location and adequate clearance for all equipment, controls, piping, pumps, valves and other items. Equipment foundations shall not be installed until equipment or piping layout drawings have been approved. Detailed layout drawings shall be provided for all piping systems. In addition, details of the following shall be provided.
 - 1. Mechanical equipment rooms.
 - 2. Interstitial space.
 - 3. Hangers, inserts, supports, and bracing.
 - 4. Pipe sleeves.
 - 5. Equipment penetrations of floors, walls, ceilings, or roofs.
- G. Maintenance Data and Operating Instructions:
 - 1. Maintenance and operating manuals in accordance with Division 01 General Requirements, for systems and equipment. Include complete list indicating all

- components of the systems with diagrams of the internal wiring for each item of equipment.
- Include listing of recommended replacement parts for keeping in stock supply, including sources of supply, for equipment shall be provided. The listing shall include belts for equipment: Belt manufacturer, model number, size and style, and distinguished whether of multiple belt sets.

1.5 QUALITY ASSURANCE

A. Products Criteria:

- 1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture, supply and servicing of the specified products for at least 5 years.
- 2. Equipment Service: There shall be permanent service organizations, authorized and trained by manufacturers of the equipment supplied, located within 100 miles of the project. These organizations shall come to the site and provide acceptable service to restore operations within four hours of receipt of notification by phone, e-mail or fax in event of an emergency, such as the shut-down of equipment; or within 24 hours in a non-emergency. Names, mail and e-mail addresses and phone numbers of service organizations providing service under these conditions for (as applicable to the project): pumps, water heaters, shall be submitted for project record and inserted into the operations and maintenance manual.
- 3. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.
- 4. The products and execution of work specified in Division 22 shall conform to the referenced codes and standards as required by the specifications. Local codes and amendments enforced by the local code official shall be enforced, if required by local authorities such as the natural gas supplier. If the local codes are more stringent, then the local code shall apply.
- 5. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
- 6. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
- 7. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
- 8. Asbestos products or equipment or materials containing asbestos shall not be used.
- B. Welding: Before any welding is performed, contractor shall submit a certificate certifying that welders comply with the following requirements:
 - 1. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".
 - 2. Comply with provisions of ASME B31 series "Code for Pressure Piping".
 - Certify that each welder and welding operator has passed American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.
- C. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the COR prior to installation. Installation of the item will not be allowed to proceed until the

recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

- D. Execution (Installation, Construction) Quality:
 - 1. All items shall be applied and installed in accordance with manufacturer's written instructions.
 - 2. All items that require access, such as for operating, cleaning, servicing, maintenance, and calibration, shall be easily and safely accessible by persons standing at floor level, or standing on permanent platforms, without the use of portable ladders.
 - 3. Complete layout drawings shall be required by Paragraph, SUBMITTALS.
 - 4. Installer Qualifications: Installer shall be licensed and shall provide evidence of the successful completion of at least five projects of equal or greater size and complexity. Provide tradesmen skilled in the appropriate trade.
- E. Plumbing Systems: Plumbing Code of New York State. Unless otherwise required herein, perform plumbing work in accordance with the latest version of the Plumbing Code of New York State.
- F. Cleanliness of Piping and Equipment Systems:
 - 1. Care shall be exercised in the storage and handling of equipment and piping material to be incorporated in the work. Debris arising from cutting, threading and welding of piping shall be removed.
 - 2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.
 - 3. The interior of all tanks shall be cleaned prior to delivery. All piping shall be tested in accordance with the specifications and the Plumbing Code of New York State.
 - 4. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protection of Equipment:
 - 1. Equipment and material placed on the job site shall remain in the custody of the Contractor. The Contractor is solely responsible for the protection of such equipment and material against any damage.
 - 2. Damaged equipment shall be replaced with an identical unit. Such replacement shall be at no additional cost or additional time to the Owner.
 - Interiors of new equipment and piping systems shall be protected against entry of foreign matter. Both inside and outside shall be cleaned before painting or placing equipment in operation.
 - 4. Existing equipment and piping being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected as required for new work.

1.7 AS-BUILT DOCUMENTATION

- A. Submit manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.
- B. Submit operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be inserted into a three ring binder. All aspects of system operation and maintenance procedures, including piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices such as

- damper and door closure interlocks shall be included. A List of recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the owner will be required to employ shall be inserted into the As-Built documentation.
- C. The installing contractor shall maintain as-built drawings of each completed phase for verification; and, shall provide the complete set at the end of the project. As-built drawings are to be provided, and a copy of them on Auto-Cad provided on compact disk or DVD.

PART 2 - PRODUCTS

2.1 REFER TO SCHEDULES AND EQUIPMENT NOTES ON DRAWINGS FOR BASIS OF DESIGN MATERIALS, MANUFACTURERS AND MODEL NUMBERS.

2.2 MATERIALS FOR VARIOUS SERVICES

- A. Solder or flux containing lead shall not be used with copper pipe.
- B. Material or equipment containing a weighted average of greater than 0.25 percent lead shall not be used in any potable water system intended for human consumption, and shall be certified in accordance with NSF 61.
- C. In-line devices such as water meters, building valves, check valves, stops, valves, fittings, tanks and backflow preventers shall comply with NSF 61 and NSF 372.

2.3 FACTORY-ASSEMBLED PRODUCTS

- A. Standardization of components shall be maximized to reduce spare part requirements.
- B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.
 - 1. All components of an assembled unit need not be products of same manufacturer.
 - 2. Constituent parts that are alike shall be products of a single manufacturer.
 - 3. Components shall be compatible with each other and with the total assembly for intended service.
 - 4. Contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly at no additional cost or time to the Owner.
- C. Components of equipment shall bear manufacturer's name and trademark, model number, serial number and performance data on a name plate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.
- D. Major items of equipment, which serve the same function, shall be the same make and model.

2.4 COMPATIBILITY OF RELATED EQUIPMENT

A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational system that conforms to contract requirements.

2.5 SAFETY GUARDS

- A. Pump shafts and couplings shall be fully guarded by a sheet steel guard, covering coupling and shaft but not bearings. Material shall be minimum 16-gage sheet steel; ends shall be braked and drilled and attached to pump base with minimum of four 1/4 inch bolts. Reinforce guard as necessary to prevent side play forcing guard onto couplings.
- B. All Equipment shall have moving parts protected from personal injury.

2.6 LIFTING ATTACHMENTS

A. Equipment shall be provided with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered, without bending or distortion of shape, such as rapid lowering and braking of load.

2.7 ELECTRIC MOTORS, MOTOR CONTROL, CONTROL WIRING

- A. All electrical wiring, conduit, and devices necessary for the proper connection, protection and operation of the systems shall be provided. Premium efficient motors shall be provided. Unless otherwise specified for a particular application, electric motors shall have the following requirements.
- B. Special Requirements:
 - 1. Assemblies of motors, starters, and controls and interlocks on factory assembled and wired devices shall be in accordance with the requirements of this specification.
 - 2. Motor sizes shall be selected so that the motors do not operate into the service factor at maximum required loads on the driven equipment. Motors on pumps shall be sized for non-overloading at all points on the pump performance curves.
- C. Single-phase Motors: Capacitor-start type for hard starting applications. Motors for centrifugal pumps may be split phase or permanent split capacitor (PSC).
- D. Poly-phase Motors: NEMA Design B, Squirrel cage, induction type. Each two-speed motor shall have two separate windings. A time delay (20 seconds minimum) relay shall be provided for switching from high to low speed.
- E. Rating: Rating shall be continuous duty at 100 percent capacity in an ambient temperature of 40° C (104° F); minimum horsepower as shown on drawings; maximum horsepower in normal operation shall not exceed nameplate rating without service factor.
- F. Insulation Resistance: Not less than one-half meg-ohm between stator conductors and frame shall be measured at the time of final inspection.

2.8 EQUIPMENT AND MATERIALS IDENTIFICATION

- A. Use symbols, nomenclature and equipment numbers specified, shown on the drawings, or shown in the maintenance manuals. Coordinate equipment and valve identification with facility maintenance staff.
- B. Valve Tags and Lists:
 - 1. Plumbing: All valves shall be provided with valve tags and listed on a valve list.

2.9 FIRESTOPPING

A. Section 07 84 00, FIRESTOPPING specifies an effective barrier against the spread of fire, smoke and gases where penetrations occur for piping.

2.10 GALVANIZED REPAIR COMPOUND

A. Mil. Spec. DOD-P-21035B, paint.

2.11 PIPE PENETRATIONS

- A. Pipe penetration sleeves shall be installed for all pipe other than rectangular blocked out floor openings for risers in mechanical bays.
- B. Pipe penetration sleeve materials shall comply with all firestopping requirements for each penetration.
- C. Penetrations are not allowed through beams or ribs, but may be installed in concrete beam flanges, with structural engineer prior approval.

2.12 TOOLS AND LUBRICANTS

- A. Furnish, and turn over to the Owner, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.
- B. Grease Guns with Attachments for Applicable Fittings: One for each type of grease required for each motor or other equipment.
- C. Tool Containers: metal, permanently identified for intended service and mounted, or located, where directed by the Owner.

2.13 WALL, FLOOR AND CEILING PLATES

- A. Material and Type: Chrome plated brass or chrome plated steel, one piece or split type with concealed hinge, with set screw for fastening to pipe, or sleeve. Use plates that fit tight around pipes, cover openings around pipes and cover the entire pipe sleeve projection.
- B. Thickness: Not less than 3/32 inch for floor plates. For wall and ceiling plates, not less than 0.025 inch for up to 3 inch pipe, 0.035 inch for larger pipe.
- C. Locations: Use where pipe penetrates floors, walls and ceilings in exposed locations, in finished areas only. Wall plates shall be used where insulation ends on exposed water supply pipe drop from overhead. A watertight joint shall be provided in spaces where brass or steel pipe sleeves are specified.

2.14 ASBESTOS

A. Materials containing asbestos are not permitted.

PART 3 – EXECUTION

3.1 ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING

- A. Location of piping, sleeves, inserts, hangers, and equipment, access provisions shall be coordinated with the work of all trades. Piping, sleeves, inserts, hangers, and equipment shall be located clear of windows, doors, openings, light outlets, and other services and utilities. Equipment layout drawings shall be prepared to coordinate proper location and personnel access of all facilities. The drawings shall be submitted for review.
- B. Manufacturer's published recommendations shall be followed for installation methods not otherwise specified.
- C. Operating Personnel Access and Observation Provisions: All equipment and systems shall be arranged to provide clear view and easy access, without use of portable ladders, for maintenance, testing and operation of all devices including, but not limited to: all equipment items, valves, backflow preventers, filters, strainers, transmitters, sensors, meters and control devices. All gages and indicators shall be clearly visible by personnel standing on the floor or on permanent platforms. Maintenance and operating space and access provisions that are shown on the drawings shall not be changed nor reduced.
- D. Structural systems necessary for pipe and equipment support shall be coordinated to permit proper installation.
- E. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.
- F. Cutting Holes:
 - Holes shall be located to avoid interference with structural members such as beams or grade beams. Holes shall be laid out in advance and drilling done only after approval. If the Contractor considers it necessary to drill through structural members, this matter shall be referred to the structural engineer for review.

- 2. Waterproof membrane shall not be penetrated. Pipe floor penetration block outs shall be provided outside the extents of the waterproof membrane.
- 3. Holes through concrete and masonry shall be cut by rotary core drill. Pneumatic hammer, impact electric, and hand or manual hammer type drill will not be allowed, except as permitted by Owner's Representative where working area space is limited.
- G. Minor Piping: Generally, small diameter pipe runs from drips and drains, water cooling, and other service are not shown but must be provided.
- H. Protection and Cleaning:
 - Equipment and materials shall be carefully handled, properly stored, and adequately
 protected to prevent damage before and during installation, in accordance with the
 manufacturer's recommendations. Damaged or defective items in the opinion of the
 Owner's Representative, shall be replaced at no additional cost or time to the Owner.
 - 2. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Pipe openings, equipment, and plumbing fixtures shall be tightly covered against dirt or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.
- I. Gages, thermometers, valves and other devices shall be installed with due regard for ease in reading or operating and maintaining said devices. Thermometers and gages shall be located and positioned to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.
- J. Interconnection of Electrical Instrumentation and Controls: Electrical interconnection is generally not shown but shall be provided. This includes interconnections of sensors, transmitters, transducers, control devices, control and instrumentation panels, alarms, instruments and computer workstations. Comply with NFPA 70.
- K. Many plumbing systems interface with the HVAC control system. See the HVAC control points list and Section 23 09 00, INSTRUMENTATION AND CONTROL FOR HVAC.
- L. Work in Existing Building:
 - 1. Perform as specified in Division 01 General Requirements.
 - 2. As specified in Division 01 General Requirements, make alterations to existing service piping at times that will cause the least interfere with normal operation of the facility.
- M. Switchgear Drip Protection: Every effort shall be made to eliminate the installation of pipe above data equipment, and electrical and telephone switchgear.

3.2 TEMPORARY PIPING AND EQUIPMENT

- A. Continuity of operation of existing facilities may require temporary installation or relocation of equipment and piping. Temporary equipment or pipe installation or relocation shall be provided to maintain continuity of operation of existing facilities.
- B. Temporary facilities and piping shall be completely removed back to the nearest active distribution branch or main pipe line and any openings in structures sealed. Dead legs are not allowed in potable water systems. Necessary blind flanges and caps shall be provided to seal open piping remaining in service.

3.3 RIGGING

A. Contractor shall provide all facilities required to deliver specified equipment and place on foundations. Attachments to structures for rigging purposes and support of equipment on structures shall be Contractor's full responsibility.

- B. Contractor shall check all clearances, weight limitations and shall provide a rigging plan designed by a Registered Professional Engineer. All modifications to structures, including reinforcement thereof, shall be at Contractor's cost, time and responsibility.
- C. Rigging plan and methods shall be referred to Owner's Representative for evaluation prior to actual work.

3.4 PIPE AND EQUIPMENT SUPPORTS

- A. Where hanger spacing does not correspond with joist or rib spacing, use structural steel channels secured directly to joist and rib structure that will correspond to the required hanger spacing, and then suspend the equipment and piping from the channels. Holes shall be drilled or burned in structural steel ONLY with the prior written approval of the structural engineer.
- B. The use of chain pipe supports, wire or strap hangers; wood for blocking, stays and bracing, or hangers suspended from piping above shall not be permitted. Rusty products shall be replaced.
- C. Hanger rods shall be used that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. A minimum of 1/2 inch clearance between pipe or piping covering and adjacent work shall be provided.
- D. Overhead Supports:
 - 1. The basic structural system of the building is designed to sustain the loads imposed by equipment and piping to be supported overhead.
 - 2. Provide steel structural members, in addition to those shown, of adequate capability to support the imposed loads, located in accordance with the final approved layout of equipment and piping.

E. Floor Supports:

- 1. Provide structural steel systems for support of equipment and piping. Structural systems shall be anchored and doweled to resist forces under operating and seismic conditions (if applicable) without excessive displacement or structural failure.
- 2. Bases and supports shall not be located and installed until equipment mounted thereon has been approved.
- 3. All equipment shall be shimmed, leveled, firmly anchored, and grouted with epoxy grout. Anchor bolts shall be placed in sleeves, anchored to the bases. Fill the annular space between sleeves and bolts with a grout material to permit alignment and realignment.

3.5 LUBRICATION

- A. All equipment and devices requiring lubrication shall be lubricated prior to initial operation. All devices and equipment shall be field checked for proper lubrication.
- B. All devices and equipment shall be equipped with required lubrication fittings.
- C. A separate grease gun with attachments for applicable fittings shall be provided for each type of grease applied.
- D. All lubrication points shall be accessible without disassembling equipment, except to remove access plates.
- E. All lubrication points shall be extended to one side of the equipment.

3.6 PLUMBING SYSTEMS DEMOLITION

A. Unless specified otherwise, all piping, wiring, conduit, and other devices associated with the equipment not re-used in the new work shall be completely removed. This includes all concrete equipment pads, pipe, valves, fittings, insulation, and all hangers including the top connection and any fastenings to building structural systems. All openings shall be

- sealed after removal of equipment, pipes, ducts, and other penetrations in roof, walls, floors, in an approved manner and in accordance with plans and specifications where specifically covered. Structural integrity of the building system shall be maintained. Reference shall also be made to the drawings and specifications of the other disciplines in the project for additional facilities to be demolished or handled.
- B. The Contractor shall remove all material and equipment, devices and demolition debris under these plans and specifications. Such material shall be removed from property expeditiously and shall not be allowed to accumulate.

3.7 CLEANING AND PAINTING

- A. Prior to final inspection and acceptance of the facilities for beneficial use by the Owner, the facilities, equipment and systems shall be thoroughly cleaned.
- B. In addition, the following special conditions apply:
 - 1. Cleaning shall be thorough. Solvents, cleaning materials and methods recommended by the manufacturers shall be used for the specific tasks. All rust shall be removed prior to painting and from surfaces to remain unpainted. Scratches, scuffs, and abrasions shall be repaired prior to applying prime and finish coats.
 - 2. Control and instrument panels shall be cleaned and damaged surfaces repaired. Touch-up painting shall be made with matching paint type and color obtained from manufacturer or computer matched.
 - 3. Pumps, motors, steel and cast iron bases, and coupling guards shall be cleaned, and shall be touched-up with the same paint type and color as utilized by the pump manufacturer.
 - 4. The final result shall be a smooth, even-colored, even-textured factory finish on all items. The entire piece of equipment shall be repainted, if necessary, to achieve this. Lead based paints shall not be used.

3.8 STARTUP AND TEMPORARY OPERATION

A. Startup of equipment shall be performed as described in the equipment specifications.

3.9 OPERATING AND PERFORMANCE TESTS

- A. Should evidence of malfunction in any tested system, or piece of equipment or component part thereof, occur during or as a result of tests, make proper corrections, repairs or replacements, and repeat tests at no additional cost to the Owner.
- B. When completion of certain work or systems occurs at a time when final control settings and adjustments cannot be properly made to make performance tests, then conduct such performance tests and finalize control settings during the first actual seasonal use of the respective systems following completion of work. Rescheduling of these tests shall be requested in writing to COR for approval.

3.10 OPERATION AND MAINTENANCE MANUALS

- A. All new and temporary equipment and all elements of each assembly shall be included.
- B. Data sheet on each device listing model, size, capacity, pressure, speed, horsepower, impeller size, and other information shall be included.
- C. Manufacturer's installation, maintenance, repair, and operation instructions for each device shall be included. Assembly drawings and parts lists shall also be included. A summary of operating precautions and reasons for precautions shall be included in the Operations and Maintenance Manual.
- D. Lubrication instructions, type and quantity of lubricant shall be included.

- E. Schematic diagrams and wiring diagrams of all control systems corrected to include all field modifications shall be included.
- F. Set points of all interlock devices shall be listed.
- G. Trouble-shooting guide for the control system troubleshooting shall be inserted into the Operations and Maintenance Manual.
- H. The control system sequence of operation corrected with submittal review comments shall be inserted into the Operations and Maintenance Manual.
- I. Emergency procedures for shutdown and startup of equipment and systems.

3.11 DEMONSTRATION AND TRAINING

A. Provide services total of eight hours minimum to instruct Owner's Personnel in operation and maintenance of the system.

END OF SECTION 220511

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Grout.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Cast Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.2 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink: recommended for interior and exterior applications.
- C. Design Mix: 5000 psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve seal system.
- C. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.

- 2. Install sleeves that are large enough to provide 1/4 inch annular clear space between sleeve and pipe or pipe insulation.
- 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 Section "Joint Sealants."
- D. Fire Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.2 SLEEVE AND SLEEVE SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than NPS 6: Cast iron wall sleeves.
 - 2. Concrete Slabs above Grade:
 - a. Piping Smaller Than NPS 6: Galvanized steel pipe sleeves or Stack sleeve fittings.
 - b. Piping NPS 6 and Larger: Galvanized steel pipe sleeves or Stack sleeve fittings.
 - 3. Interior Partitions:
 - a. Piping Smaller Than NPS 6: Galvanized steel pipe sleeves.
 - b. Piping NPS 6 and Larger: Galvanized steel sheet sleeves.

END OF SECTION 220517

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. One piece, Cast Brass Type: With polished, chrome-plated finish and setscrew fastener.
- B. One piece, Stamped steel Type: With chrome-plated finish and spring clip fasteners.

2.2 FLOOR PLATES

A. One piece Floor Plates: Cast iron flange with holes for fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.
 - Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep-pattern type.
 - b. Insulated Piping: One piece, stamped steel type.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass type with polished, chrome-plated finish.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, stamped steel type.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass type with polished, chrome-plated finish.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, stamped steel type.
 - g. Bare Piping in Unfinished Service Spaces: One piece, cast brass type with polished, chrome-plated finish.
 - h. Bare Piping in Unfinished Service Spaces: One piece, stamped steel type.

- i. Bare Piping in Equipment Rooms: One piece, cast brass type with polished, chrome-plated finish.
- j. Bare Piping in Equipment Rooms: One piece, stamped steel type.
- C. Install floor plates for piping penetrations of equipment room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - New Piping: One piece, floor plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 220518

SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Bronze ball valves.
 - 2. Bronze swing check valves.
 - 3. Bronze gate valves.
 - 4. Bronze globe valves.
- B. Related Sections:
 - Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
 - 2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

1.3 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.

1.4 SUBMITTALS

A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 2. ASME B31.1 for power piping valves.
 - 3. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 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 gate valves closed to prevent rattling.
 - 4. Set ball valves open to minimize exposure of functional surfaces.

- 5. 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 handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
 - 1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
 - 2. Handwheel: For valves other than quarter-turn types.
 - 3. Handlever: For quarter-turn valves NPS 6 and smaller.
- E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
 - 1. Gate Valves: With rising stem.
 - 2. Ball Valves: With extended operating handle of non-thermal, conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
- F. Valve-End Connections:
 - 1. Flanged: With flanges according to ASME B16.1 for iron valves.
 - 2. Solder Joint: With sockets according to ASME B16.18.
 - 3. Threaded: With threads according to ASME B1.20.1.
- G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

- A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
 - 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. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - e. Approved equal.
 - 2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig.
 - c. CWP Rating: 600 psig.
 - d. Body Design: Two piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded.
 - g. Seats: PTFE or TFE.
 - h. Stem: Bronze.

- i. Ball: Chrome-plated brass.
- j. Port: Full.

2.3 BRONZE SWING CHECK VALVES

- A. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:
 - 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. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Jenkins Valves.
 - c. Crane Co.; Crane Valve Group; Stockham Division.
 - d. Hammond Valve.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Description:
 - a. Standard: MSS SP-80, Type 4.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded.
 - f. Disc: PTFE or TFE.

2.4 BRONZE GATE VALVES

- A. Class 125, NRS Bronze Gate Valves:
 - 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. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Jenkins Valves.
 - c. Crane Co.; Crane Valve Group; Stockham Division.
 - d. Hammond Valve.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Description:
 - a. Standard: MSS SP-80, Type 1.
 - b. CWP Rating: 200 psig.
 - c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded or solder joint.
 - e. Stem: Bronze.
 - f. Disc: Solid wedge; bronze.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron, bronze, or aluminum.

2.5 BRONZE GLOBE VALVES

- A. Class 125. Bronze Globe Valves with Nonmetallic Disc:
 - 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. Crane Co.; Crane Valve Group; Crane Valves.
- b. Crane Co.; Crane Valve Group; Stockham Division.
- c. NIBCO INC.
- d. Red-White Valve Corporation.
- 2. Description:
 - a. Standard: MSS SP-80, Type 2.
 - b. CWP Rating: 200 psig.
 - c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded or solder joint.
 - e. Stem: Bronze.
 - f. Disc: PTFE or TFE.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.

3.3 ADJUSTING

A. 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.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball or gate valves.
 - 2. Throttling Service: Globe or ball valves.
 - 3. Pump-Discharge Check Valves:
 - a. NPS 2 and Smaller: Bronze swing check valves with nonmetallic disc.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

- C. Select valves, except wafer types, with the following end connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 - 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
 - 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
 - 2. Ball Valves: Two piece, full port, bronze with bronze trim.
 - 3. Bronze Swing Check Valves: Class 125, nonmetallic disc.
 - 4. Bronze Gate Valves: Class 125 NRS.
 - 5. Bronze Globe Valves: Class 125, nonmetallic disc.

END OF SECTION 220523

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - Metal pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Thermal-hanger shield inserts.
 - 4. Fastener systems.
 - 5. Pipe stands.
 - 6. Equipment supports.
- B. Related Sections:
 - 1. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of the Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:
 - 1. Trapeze pipe hangers.
 - 2. Pipe stands.
 - 3. Equipment supports.
- C. Delegated-Design Submittal: For trapeze hangers 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. Detail fabrication and assembly of trapeze hangers.
 - 2. Design Calculations: Calculate requirements for designing trapeze hangers.
- D. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Galvanized Metallic Coatings: Pre-galvanized or hot dipped.
 - 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
- B. Copper Pipe Hangers:
 - 1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

- 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. Carpenter & Paterson, Inc.
 - 2. Clement Support Services.
 - 3. ERICO International Corporation.
 - 4. National Pipe Hanger Corporation.
 - 5. PHS Industries, Inc.
 - 6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
 - 7. Piping Technology & Products, Inc.
 - 8. Rilco Manufacturing Co., Inc.
 - Value Engineered Products, Inc.
- B. Insulation Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100 psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125 psig minimum compressive strength and vapor barrier.
- C. Insulation Insert Material for Hot Piping: ASTM C 552, Type II cellular glass with 100 psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125 psig minimum compressive strength.
- D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 PIPE STANDS

A. General Requirements for Pipe Stands: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

2.6 EQUIPMENT SUPPORTS

A. Description: Welded, shop or field-fabricated equipment support made from structural carbon-steel shapes.

2.7 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000 psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- D. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- E. Pipe Stand Installation:
 - 1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
- F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

- G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- I. Install lateral bracing with pipe hangers and supports to prevent swaying.
- J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- M. Insulated Piping:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - 5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and 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. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.
- F. Use copper-plated pipe hangers for uninsulated copper piping and tubing.
- G. Use padded hangers for piping that is subject to scratching.
- H. Use thermal-hanger shield inserts for insulated piping and tubing.
- I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
 - 2. Carbon or Alloy Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
 - 3. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
 - 4. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 5. Adjustable, Swivel Split or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
 - 6. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 7. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.

- 8. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
- 9. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
- 10. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
- 11. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
- 12. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
- 13. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur
- 14. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
- 15. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
- 16. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
- 17. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
 - 2. Carbon or Alloy Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 - 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 - 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 - 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 - 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 - 2. Top Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
 - 3. Side Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 - 4. Center Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams
 - 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.

- 6. C-Clamps (MSS Type 23): For structural shapes.
- 7. Top Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
- 8. Side Beam Clamps (MSS Type 27): For bottom of steel I-beams.
- 9. Steel Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
- 10. Linked Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
- 11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
- 12. Welded Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
- 13. Side Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
- 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
- 15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 - 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 - 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 - 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
 - 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
 - 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 - 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
 - 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
 - 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
 - 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

- Horizontal (MSS Type 54): Mounted horizontally.
- Vertical (MSS Type 55): Mounted vertically. b.
- Trapeze (MSS Type 56): Two vertical-type supports and one trapeze C. member.
- Ο. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- Ρ. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- Use powder-actuated fasteners or mechanical-expansion anchors instead of building Q. attachments where required in concrete construction.
- R. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.
 - 4. Valve tags.
 - 5. Warning tags.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
 - 2. Letter Color: White.
 - 3. Background Color: Black.
 - 4. Maximum Temperature: Able to withstand temperatures up to 250 deg F.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 - 6. Minimum Letter Size: 1/2 inch.
 - 7. Fasteners: Stainless steel rivets or self-tapping screws.
 - 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's unique equipment number.

2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: White.
- C. Background Color: Black.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/2 inch.
- G. Fasteners: Stainless steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

2.4 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4 inch letters for piping system abbreviation and 1/2 inch numbers.
 - 1. Tag Material: Brass, 0.032 inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire-link or beaded chain; or S-hook.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11 inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

2.5 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: 3 by 5-1/4 inches minimum.
 - 2. Fasteners: Reinforced grommet and wire or string.
 - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 - 4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of equipment.
- B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

- A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

3.4 VALVE TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape:
 - a. 1-1/2 inches, round.
 - 2. Valve-Tag Color:
 - a. Natural.
 - Letter Color:
 - a. Black.

3.5 WARNING TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 220553

SECTION 220700 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - Insulation Materials:
 - Mineral fiber.
 - 2. Insulating cements.
 - Adhesives.
 - Mastics.
 - 5. Lagging adhesives.
 - 6. Sealants.
 - 7. Factory-applied jackets.
 - 8. Field-applied fabric-reinforcing mesh.
 - 9. Field-applied cloths.
 - 10. Field-applied jackets.
 - 11. Tapes.
 - 12. Securements.
 - 13. Corner angles.
- B. Related Sections include the following:
 - Division 23 Section "HVAC Insulation."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).
- B. Qualification Data: For qualified Installer.
- C. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- D. Field quality control reports.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application and equipment Installer for equipment insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.7 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Mineral Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For equipment applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; Commercial Board.
 - b. Fibrex Insulations Inc.; FBX.
 - c. Johns Manville; 800 Series Spin-Glas.
 - d. Knauf Insulation; Insulation Board.
 - e. Manson Insulation Inc.; AK Board.
 - f. Owens Corning; Fiberglas 700 Series.
- F. Mineral Fiber, Preformed Pipe Insulation:
 - 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. Fibrex Insulations Inc.; Coreplus 1200.

- b. Johns Manville; Micro-Lok.
- c. Knauf Insulation; 1000(Pipe Insulation.
- d. Manson Insulation Inc.; Alley-K.
- e. Owens Corning; Fiberglas Pipe Insulation.
- 2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS

- A. Mineral Fiber Insulating Cement: Comply with ASTM C 195.
 - 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. Insulco, Division of MFS, Inc.; Triple I.
 - b. P. K. Insulation Mfg. Co., Inc.; Super-Stik.
- B. Mineral Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
 - 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. Insulco, Division of MFS, Inc.; SmoothKote.
 - b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
 - c. Rock Wool Manufacturing Company; Delta One Shot.

2.3 ADHESIVE

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Mineral Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade 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. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
 - d. Marathon Industries, Inc.; 225.
 - e. Mon-Eco Industries, Inc.; 22-25.
 - 2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 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. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
 - d. Marathon Industries, Inc.; 225.
 - e. Mon-Eco Industries, Inc.; 22-25.
 - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. PVC Jacket Adhesive: Compatible with PVC jacket.
 - 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 Chemical Company (The); 739, Dow Silicone.
- b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
- c. P.I.C. Plastics, Inc.; Welding Adhesive.
- d. Speedline Corporation; Speedline Vinyl Adhesive.
- 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
 - For indoor applications, use mastics that have a VOC content of <Insert value> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
 - 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. Childers Products, Division of ITW; CP-35.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-90.
 - c. ITW TACC, Division of Illinois Tool Works; CB-50.
 - d. Marathon Industries, Inc.; 590.
 - e. Mon-Eco Industries, Inc.; 55-40.
 - f. Vimasco Corporation; 749.
 - 2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 - 5. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 - 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. Childers Products, Division of ITW; CP-10.
 - b. Foster Products Corporation, H. B. Fuller Company; 35-00.
 - c. ITW TACC, Division of Illinois Tool Works; CB-05/15.
 - d. Marathon Industries, Inc.; 550.
 - e. Mon-Eco Industries, Inc.; 55-50.
 - f. Vimasco Corporation; WC-1/WC-5.
 - 2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625 inch dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 200 deg F.
 - 4. Solids Content: 63 percent by volume and 73 percent by weight.
 - 5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.

- 1. For indoor applications, use lagging adhesives that have a VOC content of <Insert value> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Products, Division of ITW; CP-52.
 - b. Foster Products Corporation, H. B. Fuller Company; 81-42.
 - c. Marathon Industries, Inc.; 130.
 - d. Mon-Eco Industries, Inc.; 11-30.
 - e. Vimasco Corporation; 136.
- 3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over equipment and pipe insulation.
- 4. Service Temperature Range: Minus 50 to plus 180 deg F.
- 5. Color: White.

2.6 SEALANTS

- A. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
 - 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. Childers Products, Division of ITW; CP-76.
 - 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 3. Fire and water-resistant, flexible, elastomeric sealant.
 - 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 5. Color: White.
 - 6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 - 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.8 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 - 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. Johns Manville; Zeston.
 - b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto PVC Corporation; LoSmoke.
 - d. Speedline Corporation: SmokeSafe.
 - 2. Adhesive: As recommended by jacket material manufacturer.
 - 3. Color: White.

- 4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45 and 90-degree, short and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
- 5. Factory-fabricated tank heads and tank side panels.

2.9 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 - 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. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
 - b. Compac Corp.; 104 and 105.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
 - 2. Width: 3 inches.
 - 3. Thickness: 11.5 mils.
 - 4. Adhesion: 90 ounces force/inch in width.
 - 5. Elongation: 2 percent.
 - 6. Tensile Strength: 40 lbf/inch in width.
 - 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
 - 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. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
 - b. Compac Corp.; 130.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
 - d. Venture Tape; 1506 CW NS.
 - 2. Width: 2 inches.
 - 3. Thickness: 6 mils.
 - 4. Adhesion: 64 ounces force/inch in width.
 - 5. Elongation: 500 percent.
 - 6. Tensile Strength: 18 lbf/inch in width.

2.10 SECUREMENTS

A. Bands:

- 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. Childers Products; Bands.
 - b. PABCO Metals Corporation; Bands.
 - c. RPR Products, Inc.; Bands.
- 2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing or closed seal.
- 3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing or closed seal.
- 4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
- B. Insulation Pins and Hangers:

- 1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106 inch diameter shank, length to suit depth of insulation indicated.
 - 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) AGM Industries, Inc.; CWP-1.
 - 2) GEMCO; CD.
 - 3) Midwest Fasteners, Inc.; CD.
 - 4) Nelson Stud Welding; TPA, TPC, and TPS.
- 2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106 inch diameter shank, length to suit depth of insulation indicated with integral 1-1/2 inch galvanized carbon steel washer.
 - 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) AGM Industries, Inc.; CWP-1.
 - 2) GEMCO; Cupped Head Weld Pin.
 - 3) Midwest Fasteners, Inc.; Cupped Head.
 - 4) Nelson Stud Welding; CHP.
- 3. Insulation-Retaining Washers: Self-locking washers formed from 0.016 inch thick,[galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - 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) AGM Industries, Inc.; RC-150.
 - 2) GEMCO; R-150.
 - 3) Midwest Fasteners, Inc.; WA-150.
 - Nelson Stud Welding; Speed Clips.
 - b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
- 4. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016 inch thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - 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) GEMCO.
 - 2) Midwest Fasteners, Inc.
- C. Staples: Outward-clinching insulation staples, nominal 3/4 inch wide, stainless steel or Monel.
- D. Wire: 0.080 inch nickel-copper alloy.
 - 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. C & F Wire.
 - b. Childers Products.

- c. PABCO Metals Corporation.
- d. RPR Products, Inc.

2.11 CORNER ANGLES

A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
 - 1. Verify that systems and equipment to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

- 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
- 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4. Manholes.
 - 5. Handholes.
 - Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
 - 1. Comply with appropriate section requirements in Division 07 Thermal and Moisture Protection, Firestopping and fire-resistive joint sealers.
- C. Insulation Installation at Floor Penetrations:
 - 1. Pipe: Install insulation continuously through floor penetrations.
 - 2. Seal penetrations through fire-rated assemblies. Comply with appropriate section requirements in Division 07 Thermal and Moisture Protection.

3.5 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 - 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 - 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
 - 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 - 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 - 8. For services not specified to receive a field-applied jacket, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 - 9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
 - 1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 - When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless steel or aluminum bands. Select band material compatible with insulation and jacket.
 - 3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
 - 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 - 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 MINERAL FIBER INSULATION INSTALLATION

- A. Insulation Installation on Straight Pipes and Tubes:
 - 1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - 3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
 - 4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
- B. Insulation Installation on Pipe Flanges:
 - 1. Install preformed pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with Mineral Fiber blanket insulation.
 - 4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
- C. Insulation Installation on Pipe Fittings and Elbows:
 - 1. Install preformed sections of same material as straight segments of pipe insulation when available.
 - 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

- D. Insulation Installation on Valves and Pipe Specialties:
 - Install preformed sections of same material as straight segments of pipe insulation when available.
 - 2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
 - 3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - 4. Install insulation to flanges as specified for flange insulation application.

3.7 FIELD-APPLIED JACKET INSTALLATION

- A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
 - 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 EQUIPMENT INSULATION SCHEDULE

- A. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.
- B. Insulate indoor and outdoor equipment in paragraphs below that is not factory insulated.
- C. Domestic hot-water storage tank insulation shall be the following, of thickness to provide an R-value of 12.5:
 - 1. Mineral Fiber Board: 3-lb/cu. ft. nominal density.
 - 2. Mineral Fiber pipe and tank.

3.10 PIPING INSULATION SCHEDULE, GENERAL

- A. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Underground piping.
 - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold Water:
 - 1. Below 1½": Insulation shall be the following:
 - a. Mineral Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.
 - 2. 1½" and Larger: Insulation shall be the following:
 - a. Mineral Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- B. Domestic Hot and Recirculated Hot Water:
 - 1. Below 1½": Insulation shall be the following:
 - a. Mineral Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - 2. 1½" and Larger: Insulation shall be the following:
 - a. Mineral Fiber, Preformed Pipe Insulation, Type I: 1½" inch thick.

- C. Horizontal Storm Drainage Piping:
 - 1. All sizes:
 - a. Mineral Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- 3.12 INDOOR, FIELD-APPLIED JACKET SCHEDULE
 - A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
 - B. If more than one material is listed, selection from materials listed is Contractor's option.
 - C. Equipment, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches:
 - 1. PVC: 20 mils thick.

END OF SECTION 220700

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Under-building slab and aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
- 2. Specialty valves.
- 3. Flexible connectors.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14 for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.
- C. Comply with NSF 61 for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
 - 1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
 - 2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
 - 3. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
 - 4. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.

- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
- E. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.4 SPECIALTY VALVES

- A. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.
- B. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.

2.5 TRANSITION FITTINGS

- A. General Requirements:
 - 1. Same size as pipes to be joined.
 - 2. Pressure rating at least equal to pipes to be joined.
 - 3. End connections compatible with pipes to be joined.
- B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
- C. Sleeve-Type Transition Coupling: AWWA C219.
- D. Plastic-to-Metal Transition Fittings:
 - 1. Description: CPVC or PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert and one solvent-cement-socket or threaded end.
- E. Plastic-to-Metal Transition Unions:
 - 1. Description: CPVC or PVC four-part union. Include brass or stainless-steel threaded end, solvent-cement-joint plastic end, rubber O-ring, and union nut.

2.6 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. Dielectric Unions:
 - 1. Description:
 - a. Pressure Rating: 150 psig at 180 deg F.
 - b. End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Flanges:
 - 1. Description:
 - a. Factory-fabricated, bolted, companion-flange assembly.
 - b. Pressure Rating: 150 psig minimum.
 - c. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- D. Dielectric-Flange Kits:
 - Description:
 - a. Nonconducting materials for field assembly of companion flanges.
 - b. Pressure Rating: 150 psig.

- c. Gasket: Neoprene or phenolic.
- d. Bolt Sleeves: Phenolic or polyethylene.
- e. Washers: Phenolic with steel backing washers.
- E. Dielectric Couplings:
 - 1. Description:
 - a. Galvanized-steel coupling.
 - b. Pressure Rating: 300 psig at 225 deg F.
 - c. End Connections: Female threaded.
 - d. Lining: Inert and noncorrosive, thermoplastic.
- F. Dielectric Nipples:
 - 1. Description:
 - a. Electroplated steel nipple complying with ASTM F 1545.
 - b. Pressure Rating: 300 psig at 225 deg F.
 - c. End Connections: Male threaded or grooved.
 - d. Lining: Inert and noncorrosive, propylene.

2.7 FLEXIBLE CONNECTORS

- A. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
 - Working-Pressure Rating: Minimum 200 psig .
 - 2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
 - 3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.
- B. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
 - 1. Working-Pressure Rating: Minimum 200 psig.
 - 2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
 - 3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Division 31 "Earthwork" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install shutoff valve immediately upstream of each dielectric fitting.
- D. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for pressure-reducing valves.
- E. Install domestic water piping level and plumb.

- F. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- G. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- H. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- I. Install piping adjacent to equipment and specialties to allow service and maintenance.
- J. Install piping to permit valve servicing.
- K. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
- L. Install piping free of sags and bends.
- M. Install fittings for changes in direction and branch connections.
- N. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- O. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump.
- P. Install thermometers on inlet and outlet piping from each water heater.
- Q. Install sleeves for piping penetrations of walls, ceilings, and floors.
- R. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
- E. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- F. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
 - 2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - 3. PVC Piping: Join according to ASTM D 2855.
- H. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.4 VALVE INSTALLATION

- A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.
- B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 3 and smaller. Use butterfly or gate valves for piping NPS 4 and larger.
- C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."
 - 1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
 - 2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.
- D. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Set balancing valves partly open to restrict but not stop flow. Use ball valves for piping NPS 3 and smaller and butterfly valves for piping NPS 4 and larger. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves.

3.5 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.
- B. Transition Fittings in Underground Domestic Water Piping:
 - 1. NPS 1-1/2 and Smaller: Fitting-type coupling.
 - NPS 2 and Larger: Sleeve-type coupling.
- C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

3.6 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
- C. Dielectric Fittings for NPS 2-1/2 to NPS 4 Use dielectric flanges.

3.7 FLEXIBLE CONNECTOR INSTALLATION

- A. Install flexible connectors in suction and discharge piping connections to each domestic water pump.
- B. Install bronze-hose flexible connectors in copper domestic water tubing.

3.8 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.
- B. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.
 - 1. Vertical Piping: MSS Type 8 or 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - 3. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support vertical piping and tubing at base and at each floor.

- D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
 - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
 - 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
 - 6. NPS 6: 10 feet with 5/8-inch rod.
- F. Install supports for vertical copper tubing every 10 feet .
- G. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.9 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
 - 1. Connect domestic water piping to water-service piping with shutoff valve.

3.10 IDENTIFICATION

- A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.
- B. Label pressure piping with system operating pressure.

3.11 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Piping Inspections:
 - 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - 2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 - 3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
 - 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Piping Tests:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

- 2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
- 3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
- 4. Cap and subject piping to static water pressure not less than the working pressure of the system, or by an air test of not less than 50 psig, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for at least one hour. Leaks and loss in test pressure constitute defects that must be repaired. The water used for testing must be obtained from a potable source.
- 5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
- 6. Prepare reports for tests and for corrective action required.
- D. Domestic water piping will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.12 CLEANING

- A. Clean and disinfect potable domestic water piping IN ACCORDANCE WITH DEPARTMENT OF HEALTH PROCEDURES or as follows:
 - 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.13 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Aboveground domestic water piping, NPS 4 and smaller, shall be the following:

1. Hard copper tube, ASTM B 88, Type L; wrought copper solder-joint fittings; and soldered joints.

3.14 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use ball valves for piping NPS 3 and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 4 and larger.
 - 2. Throttling Duty: Use ball or globe valves for piping NPS 3 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 4 and larger.
 - 3. Hot-Water Circulation Piping, Balancing Duty: Memory-stop balancing valves.
 - 4. Drain Duty: Hose-end drain valves.
- B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following domestic water piping specialties:
 - 1. Hose bibbs.
 - Drain valves.
 - 3. Water hammer arresters.
 - Air vents.
- B. Related Sections include the following:
 - 1. Division 22 Section "Drinking Fountains and Water Coolers" for water filters for water coolers.

1.3 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Field quality control test reports.
- D. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. NSF Compliance:
 - 1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.
 - 2. Comply with NSF 61, "Drinking Water System Components Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.1 HOSE BIBBS

- A. Hose Bibbs:
 - 1. Standard: ASME A112.18.1 for sediment faucets.
 - 2. Body Material: Bronze.
 - 3. Seat: Bronze, replaceable.
 - 4. Supply Connections: NPS 3/4 threaded or solder joint inlet.
 - 5. Outlet Connection: Garden hose thread complying with ASME B1.20.7.
 - 6. Pressure Rating: 125 psig.

- 7. Vacuum Breaker: Integral, non-removable, drainable, hose connection vacuum breaker complying with ASSE 1011.
- 8. Finish for Finished Rooms: Chrome or nickel plated.
- 9. Operation for Finished Rooms: Wheel handle and Operating key.
- 10. Include operating key with each operating key hose bibb.
- 11. Include integral wall flange with each chrome or nickel plated hose bibb.

2.2 DRAIN VALVES

- A. Ball-Valve type, Hose End Drain Valves:
 - 1. Standard: MSS SP-110 for standard port, two-piece ball valves.
 - 2. Pressure Rating: 400 psig minimum CWP.
 - 3. Size: NPS 3/4.
 - 4. Body: Copper alloy.
 - 5. Ball: Chrome plated brass.
 - 6. Seats and Seals: Replaceable.
 - 7. Handle: Vinyl covered steel.
 - 8. Inlet: Threaded or solder joint.
 - 9. Outlet: Threaded, short nipple with garden hose thread complying with ASME B1.20.7 and cap with brass chain.

2.3 WATER HAMMER ARRESTERS

- A. Water Hammer Arresters:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
 - a. AMTROL, Inc.
 - b. Josam Company.
 - c. MIFAB, Inc.
 - d. PPP Inc.
 - e. Sioux Chief Manufacturing Company, Inc.
 - f. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - g. Tyler Pipe; Wade Div.
 - h. Watts Drainage Products Inc.
 - i. Zurn Plumbing Products Group; Specification Drainage Operation.
 - 2. Standard: ASSE 1010 or PDI-WH 201.
 - 3. Type: Metal bellows or Copper tube with piston.
 - 4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.4 AIR VENTS

- A. Bolted Construction Automatic Air Vents:
 - 1. Body: Bronze.
 - Pressure Rating: 125 psig minimum pressure rating at 140 deg F.
 - 3. Float: Replaceable, corrosion-resistant metal.
 - 4. Mechanism and Seat: Stainless steel.
 - 5. Size: NPS 1/2 minimum inlet.
 - 6. Inlet and Vent Outlet End Connections: Threaded.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install water hammer arresters in water piping according to PDI-WH 201.
- C. Install air vents at high points of water piping.
- D. Install supply type, trap seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor drain body, trap, or inlet fitting. Adjust valve for proper flow.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

3.3 FIELD QUALITY CONTROL

A. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

END OF SECTION 221119

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe, tube, and fittings.
 - 2. Specialty pipe fittings.
- B. Related Sections:
 - 1. Division 22 Section "Sanitary Waste Piping Specialties".

1.3 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For sovent drainage system. Include plans, elevations, sections, and details.
- C. Field quality control reports.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Owner's Representative no fewer than five days in advance of proposed interruption of sanitary waste service.
 - 2. Do not proceed with interruption of sanitary waste service without Owner's Representative's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Marked Collective Trademark (CISPI) and NSF International. Service and Extra Heavy class(es).
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.3 HUBLESS, CAST IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301. Marked Collective Trademark (CISPI) and NSF International.
- B. Sovent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast iron aerator and deaerator drainage fittings.
- C. Heavy Duty, Hubless Piping Couplings:
 - 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. ANACO-Husky
 - b. Clamp-All Corp.
 - c. Dallas Specialty & Mfg. Co.
 - d. MIFAB, Inc.
 - e. Mission Rubber Company; a division of MCP Industries, Inc.
 - f. Stant
 - g. Tyler Pipe
 - 2. Standards: ASTM C 1277 and ASTM C 1540.
 - 3. Description: Stainless steel shield with stainless steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- D. Cast Iron. Hubless Piping Couplings:
 - 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. MG Piping Products Company.
 - 2. Standard: ASTM C 1277.
 - 3. Description: Two-piece ASTM A 48/A 48M, cast iron housing; stainless steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 SPECIALTY PIPE FITTINGS

- A. Transition Couplings:
 - 1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
 - 2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
 - 3. Shielded, Nonpressure Transition Couplings:
 - 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) Cascade Waterworks Mfg. Co.
 - 2) Mission Rubber Company; a division of MCP Industries, Inc.
 - b. Standard: ASTM C 1460.

- c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant metal tension band and tightening mechanism on each end.
- B. Dielectric Fittings:
 - 1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
 - 2. Dielectric Unions:
 - 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) Capitol Manufacturing Company
 - 2) Central Plastics Company
 - 3) Hart Industries International, Inc.
 - 4) Jomar International Ltd.
 - 5) Matco-Norca, Inc.
 - 6) McDonald, A. Y. Mfg. Co.
 - 7) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 8) Wilkins; a Zurn Company
 - b. Description:
 - 1) Standard: ASSE 1079.
 - 2) Pressure Rating: 125 psig minimum at 180 deg F.
 - 3) End Connections: Solder joint copper alloy and threaded ferrous.
 - 3. Dielectric Flanges:
 - 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) Capitol Manufacturing Company
 - 2) Central Plastics Company
 - 3) Matco-Norca, Inc.
 - 4) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 5) Wilkins; a Zurn Company
 - b. Description:
 - 1) Standard: ASSE 1079.
 - 2) Factory-fabricated, bolted, companion flange assembly.
 - 3) Pressure Rating: 125 psig minimum at 180 deg F.
 - 4) End Connections: Solder joint copper alloy and threaded ferrous; threaded solder joint copper alloy and threaded ferrous.
 - 4. Dielectric-Flange Insulating Kits:
 - 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) Advance Products & Systems, Inc.
 - 2) Calpico, Inc.
 - 3) Central Plastics Company
 - 4) Pipeline Seal and Insulator, Inc.
 - b. Description:
 - 1) Nonconducting materials for field assembly of companion flanges.

- 2) Pressure Rating: 150 psig.
- 3) Gasket: Neoprene or phenolic.
- 4) Bolt Sleeves: Phenolic or polyethylene.
- 5) Washers: Phenolic with steel backing washers.

5. Dielectric Nipples:

- 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) Elster Perfection
 - 2) Grinnell Mechanical Products
 - 3) Matco-Norca, Inc.
 - 4) Precision Plumbing Products, Inc.
 - 5) Victaulic Company
- b. Description:
 - 1) Electroplated steel nipple complying with ASTM F 1545.
 - 2) Pressure Rating: 300 psig at 225 deg F.
 - 3) End Connections: Male threaded or grooved.
 - 4) Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping at indicated slopes.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long sweep bends. Sanitary tees and short sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- I. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

- 1. Building, Horizontal Sanitary Drain: ½" per foot downward in direction of flow for piping NPS 3 and smaller; 1/8" per foot downward in direction of flow for piping NPS 4 and larger.
- 2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- J. Install cast iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- K. Plumbing Specialties:
 - Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force main piping. Comply with requirements for cleanouts specified in Division 22 Section "Sanitary Waste Piping Specialties."
 - 2. Install drains in sanitary drainage gravity flow piping. Comply with requirements for drains specified in Division 22 Section "Sanitary Waste Piping Specialties."
- L. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- M. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."
- N. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."
- O. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join hub-and-spigot, cast iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.
- C. Join hubless, cast iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless piping coupling joints.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

3.3 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
 - 1. Install transition couplings at joints of piping with small differences in OD's.
 - 2. In Drainage Piping: Shielded, nonpressure transition couplings.
- B. Dielectric Fittings:

- 1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- 2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples or unions.
- 3. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for pipe hanger and support devices and installation specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
 - 1. Install carbon steel pipe hangers for horizontal piping in noncorrosive environments.
 - 2. Install carbon steel pipe support clamps for vertical piping in noncorrosive environments.
 - 3. Vertical Piping: MSS Type 8 or Type 42 clamps.
 - 4. Install individual, straight, horizontal piping runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
 - 5. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44 pipe rolls. Support pipe rolls on trapeze.
 - 6. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Support horizontal piping and tubing within 12 inches of each fitting and coupling.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double rod hangers, with 3/8 inch minimum rods.
- E. Install hangers for cast iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8 inch rod.
 - 2. NPS 3: 60 inches with 1/2 inch rod.
 - 3. NPS 4 and NPS 5: 60 inches with 5/8 inch rod.
 - 4. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- F. Install supports for vertical cast iron soil piping every 15 feet.
- G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 - 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.

5. Comply with requirements for cleanouts and drains specified in Division 22 Section "Sanitary Waste Piping Specialties."

3.6 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.7 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing-in and before setting fixtures.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 - 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1 inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
 - 5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 6. Prepare reports for tests and required corrective action.

3.8 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

- C. Place plugs in ends of uncompleted piping at end of day and when work stops.
- 3.9 PIPING SCHEDULE
 - A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
 - B. Aboveground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
 - 1. Service class, cast iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Hubless, cast iron soil pipe and fittings and sovent stack fittings, heavy-duty, hubless-piping couplings; and coupled joints.
 - 3. Dissimilar Pipe Material Couplings: Shielded, nonpressure transition couplings.

END OF SECTION 221316

SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following sanitary drainage piping specialties:
 - Cleanouts.
 - 2. Floor drains.
 - 3. Roof flashing assemblies.
 - 4. Through penetration firestop assemblies.
 - 5. Miscellaneous sanitary drainage piping specialties.
 - 6. Flashing materials.
- B. Related Sections include the following:
 - Division 22 Section "Sanitary Waste and Vent Piping".

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. FOG: Fats, oils, and greases.
- C. FRP: Fiberglass-reinforced plastic.
- D. HDPE: High density polyethylene plastic.
- E. PE: Polyethylene plastic.
- F. PP: Polypropylene plastic.
- G. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics.
- B. Field quality control test reports.
- C. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

1.6 COORDINATION

A. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Metal Cleanouts:

- compliance 1. Available Manufacturers: Subject to with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc. C.
 - Tyler Pipe; Wade Div. d.
 - Watts Drainage Products Inc. e.
 - Zurn Plumbing Products Group; Specification Drainage Operation f.
 - Josam Company; Blucher-Josam Div.
- 2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
- Size: Same as connected drainage piping
- Body Material: Hub-and-spigot, cast iron soil pipe T-branch or Hubless, cast iron 4. soil pipe test tee as required to match connected piping.
- 5. Closure: Countersunk cast iron plug.
- Closure Plug Size: Same as or not more than one size smaller than cleanout 6. size.

В. Metal Floor Cleanouts:

- Subject to Available Manufacturers: compliance with requirements, 1. manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
 - Josam Company: Josam Div. a.
 - b. Sioux Chief Manufacturing Company, Inc.
 - Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc. C.
 - d. Watts Drainage Products Inc.
 - Zurn Plumbing Products Group: Light Commercial Operation. e.
 - Josam Company; Blucher-Josam Div.
- 2. Standard: ASME A112.36.2M for heavy duty, adjustable housing threaded, adjustable housing cleanout.
- 3. Size: Same as connected branch.
- 4. Type: Adjustable housing.
- Body or Ferrule: Cast iron. 5.
- Clamping Device: Required. 6.
- 7. Outlet Connection: Inside calk or Spigot.
- Closure: Brass plug with tapered threads. 8.
- Adjustable Housing Material: Cast iron with set screws or other device. 9.
- Frame and Cover Material and Finish: Nickel-bronze, copper alloy. 10.
- 11. Frame and Cover Shape: Round.
- 12. Top Loading Classification: Light Duty.
- Riser: ASTM A 74, Service class, cast iron drainage pipe fitting and riser to 13. cleanout.
- 14. Standard: ASME A112.3.1.
- 15. Size: Same as connected branch.

C. Cast Iron Wall Cleanouts:

- Manufacturers: Subject to compliance with manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
 - Josam Company; Josam Div. a.
 - b. MIFAB, Inc.
 - Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc. C.

- d. Watts Drainage Products Inc.
- e. Zurn Plumbing Products Group; Specification Drainage Operation
- 2. Standard: ASME A112.36.2M. Include wall access.
- 3. Size: Same as connected drainage piping.
- 4. Body: Hub-and-spigot, cast iron soil pipe T-branch or Hubless, cast iron soil pipe test tee as required to match connected piping.
- 5. Closure: Countersunk, drilled and threaded plug.
- 6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
- 7. Wall Access: Round, deep, chrome-plated bronze cover plate with screw.

2.2 FLOOR DRAINS

A. Cast Iron Floor Drains:

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products Inc.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation
- 2. Standard: ASME A112.6.3.
- 3. Pattern: Floor drain.
- 4. Body Material: Epoxy coated cast iron.
- 5. Seepage Flange: Not required.
- 6. Anchor Flange: Required.
- 7. Clamping Device: Required.
- 8. Outlet: Bottom.
- 9. Backwater Valve: Not required.
- 10. Coating on Interior and Exposed Exterior Surfaces: Not required.
- 11. Sediment Bucket: Required.
- 12. Top or Strainer Material: Nickel bronze.
- 13. Top Shape: Square.
- 14. Dimensions of Top or Strainer: 6 by 6 inches
- 15. Top Loading Classification: Light Duty.
- 16. Funnel: Not required.
- 17. Trap Material: Cast iron.
- 18. Trap Pattern: Standard P-trap.
- 19. Trap Features: Refer to equipment schedule on drawing.

2.3 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies:

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
 - a. Acorn Engineering Company; Elmdor/Stoneman Div.
 - b. Thaler Metal Industries Ltd.

- B. Description: Manufactured assembly made of 6.0-lb/sq. ft., 0.0938 inch thick, lead flashing collar and skirt extending at least 8 inches from pipe, with galvanized steel boot reinforcement and counter-flashing fitting.
 - 1. Open-Top Vent Cap: Without cap.
 - 2. Low Silhouette Vent Cap: With vandal-proof vent cap.
 - 3. Extended Vent Cap: With field-installed, vandal-proof vent cap.

2.4 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

- A. Through Penetration Firestop Assemblies:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
 - a. ProSet Systems Inc.
 - 2. Standard: UL 1479 assembly of sleeve and stack fitting with firestopping plug.
 - 3. Size: Same as connected soil, waste, or vent stack.
 - 4. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
 - 5. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern, wye branch with neoprene O-ring at base and gray-iron plug in thermal release harness. Include PVC protective cap for plug.
 - 6. Special Coating: Corrosion resistant on interior of fittings.

2.5 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

- A. Open Drains:
 - 1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564, rubber gaskets.
 - 2. Size: Same as connected waste piping.
- B. Floor Drain, Trap Seal Primer Fittings:
 - 1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.
 - 2. Size: Same as floor drain outlet with NPS 1/2 side inlet.
- C. Sleeve Flashing Device:
 - Description: Manufactured, cast iron fitting, with clamping device that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized steel pipe extension in top of fitting that will extend 1 inch above finished floor and galvanized steel pipe extension in bottom of fitting that will extend through floor slab.
 - 2. Size: As required for close fit to riser or stack piping.
- D. Stack Flashing Fittings:
 - 1. Description: Counter-flashing type, cast iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
 - 2. Size: Same as connected stack vent or vent stack.

2.6 FLASHING MATERIALS

- A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
 - 1. General Use: 4.0-lb/sq. ft., 0.0625 inch thickness.
 - 2. Vent Pipe Flashing: 3.0-lb/sq. ft., 0.0469 inch thickness.
 - 3. Burning: 6-lb/sq. ft., 0.0938 inch thickness.

- B. Copper Sheet: ASTM B 152/B 152M, of the following minimum weights and thicknesses unless otherwise indicated:
 - 1. General Applications: 12 oz./sq. ft. thickness.
 - 2. Vent Pipe Flashing: 8 oz./sq. ft. thickness.
- C. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04 inch minimum thickness, unless otherwise indicated. Include G90 hot-dip galvanized, mill-phosphatized finish for painting if indicated.
- D. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.
- E. Fasteners: Metal compatible with material and substrate being fastened.
- F. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- G. Solder: ASTM B 32, lead-free alloy.
- H. Bituminous Coating: SSPC-Paint 12, solvent type, bituminous mastic.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Division 22 Section "Common work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 - 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 - 2. Locate at each change in direction of piping greater than 45 degrees.
 - 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
 - 4. Locate at base of each vertical soil and waste stack.
- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 - 1. Position floor drains for easy access and maintenance.
 - 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4 inch total depression.
 - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
 - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1 inch total depression.
 - 3. Install floor drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

- F. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- G. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
- H. Install through penetration firestop assemblies at floor penetrations.
- I. Install floor drain, trap seal primer fittings on inlet to floor drains that require trap seal primer connection.
 - 1. Exception: Fitting may be omitted if trap has trap seal primer connection.
 - Size: Same as floor drain inlet.
- J. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
- K. Install wood-blocking reinforcement for wall-mounting type specialties.
- L. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.

3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft., 0.0938 inch thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft., 0.0625 inch thickness or thinner.
 - Copper Sheets: Solder joints of copper sheets.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
 - 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.
- E. Install flashing for piping passing through roofs with counter-flashing or commercially made flashing fittings, according to Division 07 Section "Sheet Metal Flashing and Trim."
- F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast iron sleeve having calking recess.
- G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

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3.5 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319

SECTION 221413 - FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe, tube, and fittings.
 - 2. Specialty pipe fittings.

1.3 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Storm Drainage Piping: 10-foot head of water.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality control reports.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Owner's Representative no fewer than five days in advance of proposed interruption of storm drainage service.
 - 2. Do not proceed with interruption of storm drainage service without Owner's Representative's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service and Extra Heavy classes.
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.3 HUBLESS, CAST IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

- B. CISPI, Hubless-Piping Couplings:
 - 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. ANACO-Husky
 - b. Dallas Specialty & Mfg. Co.
 - c. Fernco Inc.
 - d. Matco-Norca, Inc.
 - e. MIFAB, Inc.
 - f. Mission Rubber Company; a division of MCP Industries, Inc.
 - g. Stant
 - h. Tyler Pipe
 - 2. Standards: ASTM C 1277 and CISPI 310.
 - 3. Description: Stainless steel corrugated shield with stainless steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- C. Heavy Duty, Hubless-Piping Couplings:
 - 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. ANACO-Husky
 - b. Clamp-All Corp.
 - c. Dallas Specialty & Mfg. Co.
 - d. MIFAB, Inc.
 - e. Mission Rubber Company; a division of MCP Industries, Inc.
 - f. Stant
 - g. Tyler Pipe
 - 2. Standards: ASTM C 1277 and ASTM C 1540.
 - 3. Description: Stainless steel shield with stainless steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- D. Cast Iron, Hubless-Piping Couplings:
 - 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. MG Piping Products Company
 - 2. Standard: ASTM C 1277.
 - 3. Description: Two-piece ASTM A 48/A 48M, cast iron housing; stainless steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- E. Transition Couplings:
 - 1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
 - 2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified-piping-system fitting.
 - 3. Shielded, Nonpressure Transition Couplings:
 - 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) Cascade Waterworks Mfg. Co.

- Mission Rubber Company; a division of MCP Industries, Inc. 2)
- Standard: ASTM C 1460. b.
- Description: Elastomeric or rubber sleeve with full-length, corrosionresistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

PART 3 - EXECUTION

3.1 EARTH MOVING

Comply with requirements for excavating, trenching, and backfilling specified in Α. Division 31 "Earthwork".

3.2 PIPING INSTALLATION

- Drawing plans, schematics, and diagrams indicate general location and arrangement of Α. piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- Install piping indicated to be exposed and piping in equipment rooms and service areas C. at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- Install piping above accessible ceilings to allow sufficient space for ceiling panel D.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- Install piping free of sags and bends. G.
- Install fittings for changes in direction and branch connections. Н.
- Ι. Install piping to allow application of insulation.
- J. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- K. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- L. Install storm drainage piping at the following minimum slopes unless otherwise indicated:
 - Building and Horizontal Storm Drain: 1/4" per foot downward in direction of flow for piping NPS 3 and smaller; 1/8" per foot downward in direction of flow for piping NPS 4 and larger.
- Install cast iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Μ. Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- N. Plumbing Specialties:
 - Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity flow piping. Install cleanout fitting with closure plug inside the building in storm drainage force main piping. Comply

- with requirements for cleanouts specified in Division 22 Section "Storm Drainage Piping Specialties."
- 2. Install drains in storm drainage gravity flow piping. Comply with requirements for drains specified in Division 22 Section "Storm Drainage Piping Specialties."
- O. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."
- Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."
- R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

- A. Hub-and-Spigot, Cast Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Hub-and-Spigot, Cast Iron Soil Piping Calked Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.
- C. Hubless, Cast Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

3.4 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
 - 1. Install transition couplings at joints of piping with small differences in OD's.
 - 2. In Drainage Piping: Shielded, nonpressure transition couplings.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for pipe hanger and support devices and installation specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
 - 1. Install carbon steel pipe hangers for horizontal piping in noncorrosive environments.
 - 2. Install carbon steel pipe support clamps for vertical piping in noncorrosive environments.
 - 3. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 4. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
 - 5. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Support horizontal piping and tubing within 12 inches of each fitting and coupling.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

- E. Install hangers for cast iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3: 60 inches with 1/2-inch rod.
 - 2. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 - 3. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
 - 4. Spacing for 10-foot pipe lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- F. Install supports for vertical cast iron soil piping every 15 feet.
- G. Install supports for vertical steel piping every 15 feet.
- H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect storm drainage piping to roof drains and storm drainage specialties.
 - 1. Install test tees (wall cleanouts) in conductors near floor, and floor cleanouts with cover flush with floor.
 - 2. Install horizontal backwater valves with cleanout cover flush with floor.
 - 3. Comply with requirements for backwater valves, cleanouts, and drains specified in Division 22 Section "Storm Drainage Piping Specialties."

3.7 IDENTIFICATION

A. Identify exposed storm drainage piping. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Test Procedure: Test storm drainage piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less

- than 10-foot head of water. From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.
- 4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
- 5. Prepare reports for tests and required corrective action.

3.9 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.10 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground storm drainage piping NPS 6 and smaller shall be any of the following:
 - 1. Service class, cast iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Hubless, cast iron soil pipe and fittings; CISPI, heavy duty, hubless-piping couplings; and coupled joints.
- C. Aboveground, storm drainage piping NPS 8 and larger shall be any of the following:
 - 1. Service class, cast iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Hubless, cast iron soil pipe and fittings; CISPI, heavy duty, hubless-piping couplings; and coupled joints.
- D. Underground storm drainage piping shall be the following:
 - 1. Extra Heavy class, cast iron soil pipe and fittings; gaskets; and gasketed or calking materials; and calked joints.

END OF SECTION 221413

SECTION 224000 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following conventional plumbing fixtures and related components:
 - 1. Faucets for lavatories and sinks.
 - 2. Flushometers.
 - Toilet seats.
 - 4. Protective shielding guards.
 - Fixture supports.
 - 6. Water closets.
 - 7. Urinals.
 - Lavatories.
 - Service basins.
- B. Related Sections include the following:
 - 1. Division 22 Section, "Domestic Water Piping Specialties" for specialty fixtures not included in this Section.
 - 2. Division 22 Section, "Drinking Fountains and Water Coolers."

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- C. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.
- D. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.
- E. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.
- F. FRP: Fiberglass-reinforced plastic.
- G. PMMA: Polymethyl methacrylate (acrylic) plastic.
- H. PVC: Polyvinyl chloride plastic.
- I. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.4 SUBMITTALS

- A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.
- B. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.

C. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
 - 1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.
- D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- G. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
 - 1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
 - 2. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
 - 3. Solid-Surface-Material Lavatories and Sinks: ANSI/ICPA SS-1.
 - 4. Stainless-Steel Residential Sinks: ASME A112.19.3.
 - 5. Vitreous-China Fixtures: ASME A112.19.2M.
 - 6. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
 - Water-Closet, Flushometer Tank Trim: ASSE 1037.
- H. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:
 - 1. Faucets: ASME A112.18.1.
 - 2. Hose-Connection Vacuum Breakers: ASSE 1011.
 - 3. Hose-Coupling Threads: ASME B1.20.7.
 - 4. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
 - 5. NSF Potable-Water Materials: NSF 61.
 - 6. Pipe Threads: ASME B1.20.1.
 - 7. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
 - 8. Supply Fittings: ASME A112.18.1.
 - 9. Brass Waste Fittings: ASME A112.18.2.
- I. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:
 - 1. Atmospheric Vacuum Breakers: ASSE 1001.
 - 2. Brass and Copper Supplies: ASME A112.18.1.
 - 3. Manual-Operation Flushometers: ASSE 1037.
 - 4. Brass Waste Fittings: ASME A112.18.2.
- J. Comply with the following applicable standards and other requirements specified for miscellaneous components:
 - 1. Flexible Water Connectors: ASME A112.18.6.

- 2. Floor Drains: ASME A112.6.3.
- 3. Hose-Coupling Threads: ASME B1.20.7.
- 4. Off-Floor Fixture Supports: ASME A112.6.1M.
- 5. Pipe Threads: ASME B1.20.1.
- 6. Plastic Toilet Seats: ANSI Z124.5.
- 7. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 WARRANTY

- A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components of whirlpools that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures of unit shell.
 - b. Faulty operation of controls, blowers, pumps, heaters, and timers.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - 2. Warranty Period for Commercial Applications: One year(s) from date of Substantial Completion.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
 - 2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.
 - 3. Flushometer Valve, Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than 12 of each type.

PART 2 - PRODUCTS

2.1 LAVATORY FAUCETS

- A. Lavatory Faucets:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Bradley Corporation.
 - b. Chicago Faucets.
 - c. Delta Faucet Company.
 - d. Speakman Company.
 - e. Zurn Plumbing Products Group; Commercial Brass Operation.
 - 2. Description: ADA compliant, battery powered, chrome plated faucet.
 - a. Body Material: Commercial, solid brass.
 - b. Finish: Polished chrome plate.
 - c. Maximum Flow Rate: 0.5 gpm.
 - d. Centers: 4 inches.
 - e. Mounting: Deck, exposed.
 - f. Valve Handle(s): Not applicable.
 - g. Inlet(s): NPS 3/8 tubing, plain end.

- h. Spout: Rigid type.
- i. Spout Outlet: Laminar flow.
- j. Operation: Battery operated sensor.
- k. Drain: Offset lavatory grid strainer.
- I. Tempering Device: Thermostatic mixing valve.
- m. Refer to schedule on drawings for more information.

2.2 FLUSHOMETERS

- A. Flushometers for Water Closets:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - Sloan Valve Company.
 - b. Zurn Plumbing Products Group; Commercial Brass Operation.
 - c. American Standard
 - 2. Description: ADA compliant flushometer for water-closet-type fixture. Include brass body with corrosion-resistant internal components, control stop with check valve, vacuum breaker, copper or brass tubing, and polished chrome-plated finish on exposed parts.
 - a. Internal Design: Gear driven.
 - b. Style: Exposed.
 - c. Inlet Size: NPS 1.
 - d. Trip Mechanism: Battery-operated sensor actuator with manual override.
 - e. Consumption: Dual flush, low consumption, 1.6/1.1 gal./flush.
 - f. Tailpiece Size: NPS 1-1/2, adjustable length to top of bowl.
 - g. Refer to schedule on drawings for more information.
- B. Flushometers for Urinals:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - Sloan Valve Company.
 - b. Zurn Plumbing Products Group; Commercial Brass Operation.
 - c. American Standard
 - 2. Description: ADA compliant flushometer for urinal-type fixture. Include brass body with corrosion-resistant internal components, control stop with check valve, vacuum breaker, copper or brass tubing, and polished chrome-plated finish on exposed parts.
 - a. Internal Design: Diaphragm operation.
 - b. Style: Exposed.
 - c. Inlet Size: NPS 3/4.
 - d. Trip Mechanism: Battery-operated sensor actuator with manual override button.
 - e. Consumption: 0.5 gal./flush.
 - f. Tailpiece Size: NPS 3/4 and adjustable length to top of bowl.
 - g. Refer to schedule on drawings for more information.

2.3 TOILET SEATS

A. Toilet Seats:

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Standard Companies, Inc.
 - b. Bemis Manufacturing Company.
 - c. Church Seats.
 - d. Elier.
 - e. Kohler Co.
 - f. Olsonite Corp.
- 2. Description: Toilet seat for water-closet-type fixture.
 - a. Material: Molded, commercial heavy-duty, solid plastic.
 - b. Configuration: Open front without cover.
 - c. Size: Elongated.
 - d. Hinge Type: Plastic non self-sustaining check with non-corroding 300 series stainless steel posts and pintles.
 - e. Class: Heavy-duty commercial.
 - f. Color: White.

2.4 PROTECTIVE SHIELDING GUARDS

- A. Protective Shielding Pipe Covers:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. McGuire Manufacturing Co., Inc.
 - b. TRUEBRO, Inc.
 - c. Zurn Plumbing Products Group; Tubular Brass Plumbing Products Operation.
 - 2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

2.5 FIXTURE SUPPORTS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Josam Company.
 - 2. MIFAB Manufacturing Inc.
 - 3. Smith, Jay R. Mfg. Co.
 - 4. Tyler Pipe; Wade Div.
 - 5. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
 - 6. Zurn Plumbing Products Group; Specification Drainage Operation.
- B. Water-Closet Supports:
 - Description: Combination carrier designed for accessible and standard mounting height of wall-mounting, water-closet-type fixture. Include single or double, vertical or horizontal, hub-and-spigot or hubless waste fitting as required for piping arrangement; faceplates; couplings with gaskets; feet; and fixture bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.
- C. Urinal Supports:

- 1. Description: Type II, urinal carrier with hanger and bearing plates for wall-mounting, urinal-type fixture. Include steel uprights with feet.
- 2. Accessible-Fixture Support: Include rectangular steel uprights.
- D. Lavatory Supports:
 - 1. Description: Type II, lavatory carrier with concealed arms and tie rod for wall-mounting, lavatory-type fixture. Include steel uprights with feet.
 - 2. Accessible-Fixture Support: Include rectangular steel uprights.

2.6 WATER CLOSETS

- A. Water Closets:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crane Plumbing, L.L.C./Fiat Products.
 - b. American Standard Companies, Inc.
 - c. Eljer.
 - d. Kohler Co.
 - e. TOTO USA, Inc.
 - 2. Description Standard and Accessible, wall-mounting, back-outlet, vitreous-china fixture designed for flushometer valve operation.
 - a. Style: Flushometer valve.
 - 1) Bowl Type: Elongated with siphon-jet design.
 - 2) Design Consumption: 1.6/1.1 gal./flush.
 - 3) Color: White.
 - b. Supply Spud Size: 1-1/2"
 - c. Trapway Size: 2-1/8"
 - d. Fixture Support: Water-closet support combination carrier.
 - e. Refer to schedule on drawings for more information.

2.7 URINALS

- A. Urinals:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Standard Companies, Inc.
 - b. Crane Plumbing, L.L.C./Fiat Products.
 - c. Eljer.
 - d. Kohler Co.
 - e. TOTO USA, Inc.
 - 2. Description: Standard and Accessible, wall-mounting, back-outlet, vitreous-china fixture designed for flushometer valve operation.
 - a. Type: Washout.
 - b. Strainer or Trapway: Open trapway with integral trap.
 - c. Design Consumption: 0.5 gal./flush.
 - d. Color: White.
 - e. Supply Spud Size: NPS 3/4.
 - f. Outlet Size: NPS 2.
 - g. Fixture Support: Urinal chair carrier.
 - h. Refer to schedule on drawings for more information.

2.8 LAVATORIES

- A. Wall-Mount Single User Lavatories:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Standard Companies, Inc.
 - b. Eljer.
 - c. Kohler Co.
 - d. Crane Plumbing, L.L.C./Fiat Products.
 - e. Gerber Plumbing Fixtures LLC.
 - f. TOTO USA, Inc.
 - 2. Description: Accessible, wall mounted, vitreous-china fixture.
 - Type: D-shaped bowl, front overflow, self-draining deck area with contoured back and side splash shields.
 - b. Size: 19-1/4 by 17-1/4 inches rectangular.
 - c. Faucet Hole Punching: Three holes, 4-inch centers.
 - d. Faucet Hole Location: Faucet Ledge.
 - e. Pedestal: Not required.
 - f. Color: White.
 - g. Drain: Grid with offset waste.
 - 1) Location: Near back of bowl.
 - h. Drain Piping: NPS 1-1/4 by NPS 1-1/2 chrome-plated, cast-brass P-trap; NPS 1-1/2, 0.045-inch-thick tubular brass waste to wall; and wall escutcheon.
 - i. Refer to schedule on drawings for more information.

B. Multi-Station Lavatories:

1. Description: Accessible, wall-mounted, forward curved lavatory deck with rounded edges, molded from engineered stone material to create a seamless and integral elongated basin, with stainless steel enclosed pedestal cabinet. Refer to schedule on drawings for more information.

2.9 SERVICE BASINS

- A. Mop Service Basins:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Acorn Engineering Company.
 - b. Crane Plumbing, L.L.C./Fiat Products.
 - c. Florestone Products Co., Inc.
 - d. Precast Terrazzo Enterprises, Inc.
 - e. Mustee, E. L. & Sons, Inc.
 - f. Zurn Plumbing Products Group; Light Commercial Operation.
 - 2. Description: Terrazzo, pre-cast corner mop sink composed of marble chips cast in Portland cement. Refer to drawings for additional information.
 - a. Shape: Neo-Corner series.
 - b. Size: 24 by 24 inches.
 - c. Height: 12 inches with 6 inch high front shoulder.

- d. Tiling Flange: Galvanized steel on two sides (if required, coordinate with architectural finish drawings).
- e. Rim Guard: On all top surfaces.
- f. Color: White.
- g. Faucet: Service sink faucet, chrome-plated with vacuum breaker, integral stops, adjustable wall brace, pail hook and ¾" hose thread on spout. Body inlets 8" center to center, four arm handles. Valves shall contain renewable hub, renewable seats, swivel discs, encased washers, and brass washer screws.
- h. Drain: Grid with NPS 3 outlet.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.
- B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
 - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
- D. Install wall-mounting fixtures with tubular waste piping attached to supports.
- E. Install counter-mounting fixtures in and attached to casework.
- F. Install fixtures level and plumb according to roughing-in drawings.
- G. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - 1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section, "General-Duty Valves for Plumbing Piping."
- H. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- I. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- J. Install toilet seats on water closets.
- K. Install traps on fixture outlets.
 - 1. Exception: Omit trap on fixtures with integral traps.
 - 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

- L. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section, "Escutcheons for Plumbing Piping."
- M. Set service basins in leveling bed of cement grout. Grout is specified in Division 22 Section, "Common Work Results for Plumbing."
- N. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, onepart, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section, "Joint Sealants."

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

3.4 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
- E. Install fresh batteries in sensor-operated mechanisms.

3.5 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.
- C. Replace washers and seals of leaking and dripping faucets and stops.
- D. Install fresh batteries in sensor-operated mechanisms.

3.6 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - 1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
 - Remove sediment and debris from drains.
- B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.7 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

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SECTION 224700 - DRINKING FOUNTAINS AND WATER COOLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following water coolers and related components:
 - 1. Water coolers.
 - 2. Fixture supports.

1.3 DEFINITIONS

- A. Accessible Water Cooler: Fixture that can be approached and used by people with disabilities.
- B. Cast Polymer: Dense, cast-filled polymer plastic.
- C. Fitting: Device that controls flow of water into or out of fixture.
- D. Fixture: Drinking fountain or water cooler unless one is specifically indicated.
- E. Water Cooler: Electrically powered fixture for generating and delivering cooled drinking water.

1.4 SUBMITTALS

- A. Product Data: For each fixture indicated. Include rated capacities, furnished specialties, and accessories.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Field quality control test reports.
- D. Operation and Maintenance Data: For fixtures to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities" Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act" for fixtures for people with disabilities.
- C. NSF Standard: Comply with NSF 61, "Drinking Water System Components Health Effects," for fixture materials that will be in contact with potable water.
- D. ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking Water Coolers," for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.
- E. ASHRAE Standard: Comply with ASHRAE 34, "Designation and Safety Classification of Refrigerants," for water coolers. Provide HFC 134a (tetrafluoroethane) refrigerant, unless otherwise indicated.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filter Cartridges: Two of each type installed for each fixture.

PART 2 - PRODUCTS

2.1 WATER COOLERS

- A. Water Coolers, Bi-Level Wall Mounted, with Bottle Filler:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Elkay Manufacturing Co.
 - b. Halsey Taylor.
 - c. Haws Corporation.
 - 2. Description: Self-contained, wall mounted, electric, two-level water cooler with bottle filling station. Bottle filling unit shall include an automatic 20-second shut-off timer, visual user interface displaying bottles saved from waste and filter replacement, and provide 1.1 to 1.5 GPM flow rate with laminar flow to minimize splashing. Unit shall meet ADA guidelines, have lead-free design certified to meet NSF/ANSI 61 and 372, be certified to UL399. Refer to drawings for additional information.
 - a. Cabinet: Stainless steel.
 - b. Bubbler: One, vandal-resistant, located on deck.
 - c. Control: Vandal-resistant, Push button.
 - d. Supply: NPS 3/8 with ball, gate, or globe valve.
 - e. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
 - f. Drain: Grid with NPS 1-1/2 minimum horizontal waste and trap complying with ASME A112.18.2.
 - g. Cooling System: Electric, with hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, R-134A refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
 - 1) Capacity: 8 gph of 50 deg F cooled water from 80 deg F inlet water and 90 deg F ambient air temperature.
 - 2) Electrical Characteristics: 120-V ac; single phase; 60 Hz.

2.2 FIXTURE SUPPORTS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Josam Co.
 - 2. MIFAB Manufacturing, Inc.
 - 3. Smith, Jay R. Mfg. Co.
 - 4. Tyler Pipe; Wade Div.
 - 5. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
 - 6. Zurn Plumbing Products Group; Specification Drainage Operation.

- B. Description: ASME A112.6.1M, water cooler carriers. Include vertical, steel uprights with feet and tie rods and bearing plates with mounting studs matching fixture to be supported.
 - 1. Type I: Hanger-type carrier with two vertical uprights.
 - 2. Type II: Bilevel, hanger-type carrier with three vertical uprights.
 - 3. Supports for Accessible Fixtures: Include rectangular, vertical, steel uprights instead of steel pipe uprights.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for water and waste piping systems to verify actual locations of piping connections before fixture installation. Verify that sizes and locations of piping and types of supports match those indicated.
- B. Examine walls and floors for suitable conditions where fixtures are to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Use carrier off-floor supports for wall-mounting fixtures, unless otherwise indicated.
- B. Use mounting frames for recessed water coolers, unless otherwise indicated.
- C. Use chrome-plated brass or copper tube, fittings, and valves in locations exposed to view. Plain copper tube, fittings, and valves may be used in concealed locations.

3.3 INSTALLATION

- A. Install off-floor supports affixed to building substrate and attach wall-mounting fixtures, unless otherwise indicated.
- B. Install mounting frames affixed to building construction and attach recessed water coolers to mounting frames, unless otherwise indicated.
- C. Install fixtures level and plumb. For fixtures indicated for children, install at height required by authorities having jurisdiction.
- D. Install water-supply piping with shutoff valve on supply to each fixture to be connected to water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Division 22 Section, "General-Duty Valves for Plumbing Piping."
- E. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.
- F. Install pipe escutcheons at wall penetrations in exposed, finished locations. Use deeppattern escutcheons where required to conceal protruding pipe fittings. Escutcheons are specified in Division 22 Section, "Escutcheons for Plumbing Piping."
- G. Seal joints between fixtures and walls and floors using sanitary-type, one-part, mildewresistant, silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section, "Joint Sealants."

3.4 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- C. Ground equipment according to Division 26 Section, "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Division 26 Section, "Low-Voltage Electrical Power Conductors and Cables."

3.5 FIELD QUALITY CONTROL

- A. Water Cooler Testing: After electrical circuitry has been energized, test for compliance with requirements. Test and adjust controls and safeties.
 - 1. Remove and replace malfunctioning units and retest as specified above.
 - 2. Report test results in writing.

3.6 ADJUSTING

- A. Adjust fixture flow regulators for proper flow and stream height.
- B. Adjust water cooler temperature settings.

3.7 CLEANING

- A. After completing fixture installation, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

SECTION 230511 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

- A. The requirements of this Section apply to all sections of Division 23.
- B. Definitions:
 - 1. Exposed: Piping, ductwork, and equipment exposed to view in finished rooms.
 - 2. Option or optional: Contractor's choice of an alternate material or method.

1.3 QUALITY ASSURANCE

- A. Mechanical, electrical and associated systems shall be safe, reliable, efficient, durable, easily and safely operable and maintainable, easily and safely accessible, and in compliance with applicable codes as specified.
- B. Products Criteria:
 - 1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years (or longer as specified elsewhere). The design, model and size of each item shall have been in satisfactory and efficient operation on at least three installations for approximately three years. However, digital electronics devices, software and systems such as controls, instruments, computer work station, shall be the current generation of technology and basic design that has a proven satisfactory service record of at least three years. See other specification sections for any exceptions and/or additional requirements.
 - 2. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.
 - 3. Conform to codes and standards as required by the specifications. Conform to local codes, if the local codes are more stringent than those specified.
 - 4. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
 - 5. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
 - 6. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
 - 7. Asbestos products or equipment or materials containing asbestos shall not be used.
- C. Equipment Service Organizations:
 - 1. HVAC: Products and systems shall be supported by service organizations that maintain a complete inventory of repair parts and are located within 50 miles to the site.
- D. HVAC Mechanical Systems Welding: Before any welding is performed, contractor shall submit a certificate certifying that welders comply with the following requirements:

- 1. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".
- 2. Comply with provisions of ASME B31 series "Code for Pressure Piping".
- 3. Certify that each welder has passed American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.
- E. Execution (Installation, Construction) Quality:
 - 1. Apply and install all items in accordance with manufacturer's written instructions. Refer conflicts between the manufacturer's instructions and the contract drawings and specifications to the Engineer for resolution.
 - Provide complete layout drawings required by Paragraph, SUBMITTALS. Do not commence construction work on any system until the layout drawings have been approved.

1.4 SUBMITTALS

- A. Submit in accordance with Division 01, and with requirements in the individual specification sections.
- B. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements.
- C. If equipment is submitted which differs in arrangement from that shown, provide drawings that show the rearrangement of all associated systems. Approval will be given only if all features of the equipment and associated systems, including accessibility, are equivalent to that required by the contract.
- D. Prior to submitting shop drawings for approval, contractor shall verify that manufacturers of all major items of equipment have each reviewed drawings and specifications, and have jointly coordinated and properly integrated their equipment and controls to provide a complete and efficient installation.
- E. Submittals and shop drawings for interdependent items, containing applicable descriptive information, shall be furnished together and complete in a group. Coordinate and properly integrate materials and equipment in each group to provide a completely compatible and efficient.
- F. Layout Drawings:
 - 1. Submit complete consolidated and coordinated layout drawings for all new systems, and for existing systems that are in the same areas.
 - 2. The drawings shall include plan views, elevations and sections of all systems. Clearly identify and dimension the proposed locations of the principal items of equipment. The drawings shall clearly show locations and adequate clearance for all equipment, piping, valves, control panels and other items. Show the access means for all items requiring access for operations and maintenance. Provide detailed layout drawings of all piping and duct systems.
 - 3. Do not install equipment foundations, equipment or piping until layout drawings have been approved.
 - 4. In addition, for HVAC systems, provide details of the following:
 - a. Mechanical equipment rooms.
 - c. Hangers, inserts, supports, and bracing.
 - d. Pipe sleeves.
 - e. Duct or equipment penetrations of floors, walls, ceilings, or roofs.
- G. Manufacturer's Literature and Data: Submit under the pertinent section rather than under this section.
 - 1. Submit belt drive with the driven equipment.

- 2. Submit electric motor data and variable speed drive data with the driven equipment.
- 3. Equipment and materials identification.
- 4. Fire-stopping materials.
- 5. Hangers, inserts, supports and bracing. Provide load calculations for variable spring and constant support hangers.
- 6. Wall, floor, and ceiling plates.
- H. HVAC Maintenance Data and Operating Instructions:
 - 1. Maintenance and operating manuals in accordance with Division 01, for systems and equipment.
 - Provide a listing of recommended replacement parts for keeping in stock supply, including sources of supply, for equipment. Include in the listing belts for equipment: Belt manufacturer, model number, size and style, and distinguished whether of multiple belt sets.
- I. Provide copies of approved HVAC equipment submittals to the Testing, Adjusting and Balancing and Commissioning Subcontractor.
- L. Completed System Readiness Checklist provided by the Commissioning Agent and completed by the Contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.
- M. Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B.	Air Conditioning,	Heating and	Refrigeration I	nstitute (AHR	l):
	430-2009		Central Station	Air-Handling	Units

C. American National Standard Institute (ANSI):

B31.1-2007..... Power Piping

D. Rubber Manufacturers Association (ANSI/RMA):

	Sheaves
IP-21-2009	Specifications for Drives Using Double-V (Hexagonal) Belts
IP-22-2007	Specifications for Drives Using Narrow V-Belts and Sheaves

E. Air Movement and Control Association (AMCA):

IP-20-2007 Specifications for Drives Using Classical V-Belts and

F. American Society of Mechanical Engineers (ASME):

Boiler and Pressure Vessel Code (BPVC):

Section I-2007 Power Boilers

Section IX-2007...... Welding and Brazing Qualifications

Code for Pressure Piping:

B31.1-2007..... Power Piping

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

A36/A36M-08 Standard Specification for Carbon Structural Steel
A575-96(2007) Standard Specification for Steel Bars, Carbon, Merchant

Quality, M-Grades

E84-10.....Standard Test Method for Surface Burning Characteristics of

Building Materials

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	E119-09c	. Standard Test Methods for Fire Tests of Building Construction and Materials	
Н.	Manufacturers Standardization	on Society (MSS) of the Valve and Fittings Industry, Inc:	
		. Pipe Hangers and Supports-Materials, Design and Manufacture, Selection, Application, and Installation	
	SP 69-2003	Pipe Hangers and Supports-Selection and Application	
	SP 127-2001	. Bracing for Piping Systems, Seismic – Wind – Dynamic,	
		Design, Selection, Application	
Ι.	National Electrical Manufacturers Association (NEMA):		
	MG-1-2009		
J.	National Fire Protection Association (NFPA):		
	31-06	. Standard for Installation of Oil-Burning Equipment	
	54-09		
	70-08	. National Electrical Code	
	85-07	. Boiler and Combustion Systems Hazards Code	
	90A-09	. Standard for the Installation of Air Conditioning and Ventilating Systems	
	101-09		

1.6 DELIVERY, STORAGE AND HANDLING

A. Protection of Equipment:

- 1. Equipment and material placed on the job site shall remain in the custody of the Contractor. The Contractor is solely responsible for the protection of such equipment and material against any damage.
- 2. Place damaged equipment in first class, new operating condition; or, replace same. Such repair or replacement shall be at no additional cost to the Owner.
- 3. Protect interiors of new equipment and piping systems against entry of foreign matter. Clean both inside and outside before painting or placing equipment in operation.
- 4. Existing equipment and piping being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected as required for new work.
- B. Cleanliness of Piping and Equipment Systems:
 - 1. Exercise care in storage and handling of equipment and piping material to be incorporated in the work. Remove debris arising from cutting, threading and welding of piping.
 - 2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.
 - 3. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

PART 2 - PRODUCTS

2.1 REFER TO SCHEDULES AND EQUIPMENT NOTES ON DRAWINGS FOR BASIS OF DESIGN MATERIALS, MANUFACTURERS AND MODEL NUMBERS.

2.2 FACTORY-ASSEMBLED PRODUCTS

A. Provide maximum standardization of components to reduce spare part requirements.

- B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.
 - 1. All components of an assembled unit need not be products of same manufacturer.
 - 2. Constituent parts that are alike shall be products of a single manufacturer.
 - 3. Components shall be compatible with each other and with the total assembly for intended service.
 - 4. Contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly.
- C. Components of equipment shall bear manufacturer's name and trademark, model number, serial number and performance data on a name plate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.
- D. Major items of equipment, which serve the same function, must be the same make and model. Exceptions will be permitted if performance requirements cannot be met.

2.3 COMPATIBILITY OF RELATED EQUIPMENT

A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational plant that conforms to contract requirements.

2.4 LIFTING ATTACHMENTS

A. Provide equipment with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered, without bending or distortion of shape, such as rapid lowering and braking of load.

2.5 ELECTRIC MOTORS

A. All material and equipment furnished and installation methods shall conform to the requirements of Section 23 05 13, COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT. Provide all electrical wiring, conduit, and devices necessary for the proper connection, protection and operation of the systems. Provide special energy efficient premium efficiency type motors as scheduled.

2.6 VARIABLE SPEED MOTOR CONTROLLERS

A. Refer to Section 26 29 23, VARIABLE-FREQUENCY MOTOR CONTROLLERS for specifications.

2.7 EQUIPMENT AND MATERIALS IDENTIFICATION

A. Use symbols, nomenclature and equipment numbers specified, shown on the drawings and shown in the maintenance manuals.

2.8 FIRESTOPPING

A. Section 07 84 00, FIRESTOPPING specifies an effective barrier against the spread of fire, smoke and gases where penetrations occur for piping and ductwork.

2.9 GALVANIZED REPAIR COMPOUND

A. Mil. Spec. DOD-P-21035B, paint form.

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2.10 PIPE PENETRATIONS

- A. Penetrations are not allowed through beams or ribs, but may be installed in concrete beam flanges. Any deviation from these requirements must receive prior approval of Structural Engineer.
- B. Sleeve Clearance: Sleeve through floors, walls, partitions, and beam flanges shall be one inch greater in diameter than external diameter of pipe. Sleeve for pipe with insulation shall be large enough to accommodate the insulation. Interior openings shall be caulked tight with fire stopping material and sealant to prevent the spread of fire, smoke, and gases.

2.11 DUCT PENETRATIONS

- A. Provide curbs for roof mounted ductwork and equipment. Curbs shall be 16 inches high with continuously welded seams, built-in cant strip, interior baffle with acoustic insulation, curb bottom, hinged curb adapter.
- B. Provide firestopping for openings through fire and smoke barriers, maintaining minimum required rating of floor, ceiling or wall assembly. See section 07 84 00, FIRESTOPPING.

2.12 SPECIAL TOOLS AND LUBRICANTS

- A. Furnish, and turn over to the Owner, tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.
- B. Grease Guns with Attachments for Applicable Fittings: One for each type of grease required for each motor or other equipment.
- C. Refrigerant Tools: Provide system gauges, fittings, and tools required for maintenance of furnished equipment.
- D. Tool Containers: Metal, permanently identified for intended service and mounted, or located, where directed by the Owner.

2.13 WALL, FLOOR AND CEILING PLATES

- A. Material and Type: Chrome plated brass or chrome plated steel, one piece or split type with concealed hinge, with set screw for fastening to pipe, or sleeve. Use plates that fit tight around pipes, cover openings around pipes and cover the entire pipe sleeve projection.
- B. Thickness: Not less than 3/32-inch for floor plates. For wall and ceiling plates, not less than 0.025-inch for up to 3-inch pipe, 0.035-inch for larger pipe.
- C. Locations: Use where pipe penetrates floors, walls and ceilings in exposed locations, in finished areas only. Provide a watertight joint in spaces where brass or steel pipe sleeves are specified.

2.14 ASBESTOS

Materials containing asbestos are not permitted.

PART 3 - EXECUTION

3.1 ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING

A. Coordinate location of piping, sleeves, inserts, hangers, ductwork and equipment. Locate piping, sleeves, inserts, hangers, ductwork and equipment clear of windows, doors, openings, light outlets, and other services and utilities. Prepare equipment layout drawings to coordinate proper location and personnel access of all facilities. Submit the

- drawings for review as required by Part 1. Follow manufacturer's published recommendations for installation methods not otherwise specified.
- B. Operating Personnel Access and Observation Provisions: Select and arrange all equipment and systems to provide clear view and easy access, without use of portable ladders, for maintenance and operation of all devices including, but not limited to: all equipment items, valves, filters, strainers, transmitters, sensors, control devices. All gages and indicators shall be clearly visible by personnel standing on the floor or on permanent platforms. Do not reduce or change maintenance and operating space and access provisions that are shown on the drawings.
- C. Equipment and Piping Support: Coordinate structural systems necessary for pipe and equipment support with pipe and equipment locations to permit proper installation.
- D. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.
- E. Cutting Holes:
 - 1. Cut holes through concrete and masonry by rotary core drill. Pneumatic hammer, impact electric, and hand or manual hammer type drill will not be allowed, except as permitted by Owner's Representative where working area space is limited.
 - Locate holes to avoid interference with structural members such as beams. Holes shall be laid out in advance and drilling done only after approval by Owner's Representative. If the Contractor considers it necessary to drill through structural members, this matter shall be referred to Owner's Representative for approval.
 - 3. Do not penetrate membrane waterproofing.
- F. Minor Piping: Generally, small diameter pipe runs from drips and drains, water cooling, and other service are not shown but must be provided.
- G. Electrical Interconnection of Controls and Instruments: This generally not shown but must be provided. This includes interconnections of sensors, transmitters, transducers, control devices, control and instrumentation panels, instruments and computer workstations. Comply with NFPA-70.
- H. Protection and Cleaning:
 - 1. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations. Damaged or defective items in the opinion of the Owner's Representative, shall be replaced.
 - 2. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water chemical, or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.
- I. Install gages, thermometers, valves and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position thermometers and gages to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.
- J. Work in Existing Building:
 - 1. Perform as specified in Division 01 General Requirements.
 - 2. As specified in Division 01 General Requirements, make alterations to existing service piping at times that will least interfere with normal operation of the facility.
- K. Switchgear/Electrical Equipment Drip Protection: Every effort shall be made to eliminate the installation of pipe above electrical and telephone

3.2 TEMPORARY PIPING AND EQUIPMENT

- A. Continuity of operation of existing facilities will generally require temporary installation or relocation of equipment and piping.
- B. Temporary facilities and piping shall be completely removed and any openings in structures sealed. Provide necessary blind flanges and caps to seal open piping remaining in service.

3.3 RIGGING

- A. Contractor shall provide all facilities required to deliver specified equipment and place on foundations. Attachments to structures for rigging purposes and support of equipment on structures shall be Contractor's full responsibility.
- B. Contractor shall check all clearances, weight limitations and shall offer a rigging plan designed by a Registered Professional Engineer. All modifications to structures, including reinforcement thereof, shall be at Contractor's cost, time and responsibility.
- C. Rigging plan and methods shall be referred to the Owner's Representative for evaluation prior to actual work.

3.4 PIPE AND EQUIPMENT SUPPORTS

- A. Where hanger spacing does not correspond with joist or rib spacing, use structural steel channels secured directly to joist and rib structure that will correspond to the required hanger spacing, and then suspend the equipment and piping from the channels. Drill or burn holes in structural steel only with the prior approval of the Structural Engineer.
- B. Use of chain, wire or strap hangers; wood for blocking, stays and bracing; or, hangers suspended from piping above will not be permitted. Replace or thoroughly clean rusty products and paint with zinc primer.
- C. Use hanger rods that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. Provide a minimum of 1/2-inch clearance between pipe or piping covering and adjacent work.
- D. HVAC Horizontal Pipe Support Spacing: Refer to MSS SP-69. Provide additional supports at valves, strainers, in-line pumps and other heavy components. Provide a support within one foot of each elbow.

E. Overhead Supports:

- 1. The basic structural system of the building is designed to sustain the loads imposed by equipment and piping to be supported overhead.
- 2. Provide steel structural members, in addition to those shown, of adequate capability to support the imposed loads, located in accordance with the final approved layout of equipment and piping.

F. Floor Supports:

- 1. Provide structural steel systems for support of equipment and piping. Anchor and dowel structural systems to resist forces under operating and seismic conditions (if applicable) without excessive displacement or structural failure.
- 2. Do not locate or install bases and supports until equipment mounted thereon has been approved.
- 3. All equipment shall be shimmed, leveled, firmly anchored, and grouted with epoxy grout. Anchor bolts shall be placed in sleeves, anchored to the bases. Fill the annular space between sleeves and bolts with a granular material to permit alignment and realignment.

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3.5 MECHANICAL DEMOLITION

- A. In an operating facility, maintain the operation, cleanliness and safety. Confine the work to the immediate area concerned; maintain cleanliness and wet down demolished materials to eliminate dust. Do not permit debris to accumulate in the area to the detriment of operation. Perform all flame cutting to maintain the fire safety integrity. Adequate fire extinguishing facilities shall be available at all times. Perform all work in accordance with recognized fire protection standards.
- B. Completely remove all piping, wiring, conduit, and other devices associated with the equipment not to be re-used in the new work. This includes all pipe, valves, fittings, insulation, and all hangers including the top connection and any fastenings to building structural systems. Seal all openings, after removal of equipment, pipes, ducts, and other penetrations in roof, walls, floors, in an approved manner and in accordance with plans and specifications where specifically covered. Structural integrity of the building system shall be maintained. Reference shall also be made to the drawings and specifications of the other disciplines in the project for additional facilities to be demolished or handled.
- C. The Contractor shall remove all other material and equipment, devices and demolition debris under these plans and specifications. Such material shall be removed from the property expeditiously and shall not be allowed to accumulate.

3.6 CLEANING AND PAINTING

- A. Prior to final inspection and acceptance of the facilities for beneficial use by the Owner, the facilities, equipment and systems shall be thoroughly cleaned.
- B. In addition, the following special conditions apply:
 - 1. Cleaning shall be thorough. Use solvents, cleaning materials and methods recommended by the manufacturers for the specific tasks. Remove all rust prior to painting and from surfaces to remain unpainted. Repair scratches, scuffs, and abrasions prior to applying prime and finish coats.
 - 3. Control and instrument panels shall be cleaned, damaged surfaces repaired, and shall be touched-up with matching paint obtained from panel manufacturer.
 - 4. Pumps, motors, steel and cast iron bases, and coupling guards shall be cleaned, and shall be touched-up with the same color as utilized by the pump manufacturer
 - 5. Final result shall be smooth, even-colored, even-textured factory finish on all items. Completely repaint the entire piece of equipment if necessary to achieve this. Lead based paints shall not be used.

3.7 STARTUP AND TEMPORARY OPERATION

- A. Startup equipment as described in equipment specifications.
- B. Perform tests as recommended by product manufacturer and listed standards and under actual or simulated operating conditions and prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with the system of which each item is an integral part.
- C. When any defects are detected, correct defects and repeat test at no additional cost or time to the Owner.
- D. The Commissioning Agent will observe startup and Contractor testing of selected equipment. Coordinate the startup and Contractor testing schedules with Owner's Representative and Commissioning Agent. Provide a minimum notice of 10 working days prior to startup and testing.

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3.8 OPERATING AND PERFORMANCE TESTS

- A. Should evidence of malfunction in any tested system, or piece of equipment or component part thereof, occur during or as a result of tests, make proper corrections, repairs or replacements, and repeat tests at no additional cost to the Owner.
- B. When completion of certain work or system occurs at a time when final control settings and adjustments cannot be properly made to make performance tests, then make performance tests for heating systems and for cooling systems respectively during first actual seasonal use of respective systems following completion of work.
- C. Perform tests as required for commissioning provisions in accordance with Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

3.9 COMMISSIONING

- A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.
- B Components provided under this section of the specification will be tested as part of a larger system.

3.10 DEMONSTRATION AND TRAINING

A. Provide services total of twenty-four hours minimum to instruct Owner's Personnel in operation and maintenance of the system.

SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general requirements for single phase and polyphase, general purpose, horizontal, small and medium, squirrel cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

- A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.
- B. Comply with NEMA MG 1 unless otherwise indicated.
- C. Comply with IEEE 841 for severe duty motors.

2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
 - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
 - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Multispeed Motors: Separate winding for each speed.
- F. Rotor: Random wound, squirrel cage.
- G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

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The Tomporatare Face, materi mediation rating.

- I. Insulation: Class F.
- J. Code Letter Designation:
 - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse width modulated inverters.
 - 2. Energy and Premium Efficient Motors: Class B temperature rise; Class F insulation.
 - 3. Inverter Duty Motors: Class F temperature rise; Class H insulation.
 - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.5 SINGLE PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent split capacitor.
 - 2. Split phase.
 - 3. Capacitor start, inductor run.
 - 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable torque, permanent split capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

SECTION 230516 - EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Expansion-compensator packless expansion joints.
 - 2. Alignment guides and anchors.

1.3 PERFORMANCE REQUIREMENTS

- A. Compatibility: Products shall be suitable for piping service fluids, materials, working pressures, and temperatures.
- B. Capability: Products to absorb 200 percent of maximum axial movement between anchors.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Delegated-Design Submittal: For each anchor and alignment guide indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the gualified professional engineer responsible for their preparation.
 - Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and swing connections.
 - 2. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.
 - 3. Alignment Guide Details: Detail field assembly and attachment to building structure.
 - 4. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint.
- C. Welding certificates.
- D. Product Certificates: For each type of expansion joint, from manufacturer.
- E. Maintenance Data: For expansion joints to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel."
 - 2. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 PACKLESS EXPANSION JOINTS

A. Metal, Expansion-Compensator Packless Expansion Joints:

- 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. Adsco Manufacturing LLC.
 - b. Flexicraft Industries.
 - c. Flex-Weld. Inc.
 - d. Hyspan Precision Products, Inc.
 - e. Metraflex, Inc.
 - f. Approved Equal.
- 2. Minimum Pressure Rating: 175 psig unless otherwise indicated.
- 3. Configuration for Copper Tubing: Two ply, phosphor-bronze bellows with copper pip ends.
 - a. End connections for copper tubing NPS 2 and Smaller: Solder joint.
 - b. End connections for copper tubing NPS 2-1/2 to NPS 4: Threaded.
- 4. Configuration for Steel Piping: Two ply, stainless steel bellows; steel pipe end connections; and carbon steel shroud.
 - a. End connections for steel pipe NPS 2 and Smaller: Threaded.
 - b. End connections for steel pipe NPS 2-1/2 to NPS 4: Flanged.

2.2 ALIGNMENT GUIDES AND ANCHORS

- A. Alignment Guides:
 - 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. Adsco Manufacturing LLC.
 - b. Advanced Thermal Systems, Inc.
 - c. Flex-Hose Co., Inc.
 - d. Flexicraft Industries.
 - e. Flex-Weld. Inc.
 - f. Hyspan Precision Products, Inc.
 - g. Metraflex, Inc.
 - h. Approved Equal
 - 2. Description: Steel, factory-fabricated alignment guide, with bolted two-section outer cylinder and base for attaching to structure; with two-section guiding spider for bolting to pipe.
- B. Anchor Materials:
 - 1. Steel Shapes and Plates: ASTM A 36/A 36M.
 - 2. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel hex head.
 - 3. Washers: ASTM F 844, steel, plain, flat washers.
 - 4. Mechanical Fasteners: Insert-wedge type stud with expansion plug anchor for use in hardened portland cement concrete, with tension and shear capacities appropriate for application.
 - a. Stud: Threaded, zinc-coated carbon steel.
 - b. Expansion Plug: Zinc-coated steel.
 - c. Washer and Nut: Zinc-coated steel.

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PART 3 - EXECUTION

3.1 EXPANSION JOINT INSTALLATION

- A. Install expansion joints of sizes matching sizes of piping in which they are installed.
- B. Install metal bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."

3.2 ALIGNMENT GUIDE AND ANCHOR INSTALLATION

- A. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.
- B. Install one guide(s) on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.
- C. Attach guides to pipe and secure guides to building structure.
- D. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.
- E. Anchor Attachments:
 - Anchor Attachment to Steel Pipe: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 2. Anchor Attachment to Copper Tubing: Attach with pipe hangers. Use MSS SP-69, Type 24, U-bolts bolted to anchor.
- F. Fabricate and install steel anchors by welding steel shapes, plates, and bars. Comply with ASME B31.9 and AWS D1.1/D1.1M.
 - Anchor Attachment to Steel Structural Members: Attach by welding.
 - 2. Anchor Attachment to Concrete Structural Members: Attach by fasteners. Follow fastener manufacturer's written instructions.
- G. Use grout to form flat bearing surfaces for guides and anchors attached to concrete.

SECTION 230517 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - Sleeves.
 - 2. Grout.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Galvanized Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- B. Galvanized Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.2 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post hardening and volume adjusting, dry, hydraulic cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000 psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve seal system.
- C. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4 inch annular clear space between sleeve and pipe or pipe insulation.
 - 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 Section "Joint Sealants."

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- floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."
- 3.2 SLEEVE AND SLEEVE SEAL SCHEDULE
 - A. Use sleeves and sleeve seals for the following piping penetration applications:
 - 1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than NPS 6: Galvanized steel wall sleeves.
 - b. Piping NPS 6 and Larger: Galvanized steel wall sleeves.
 - 2. Concrete Slabs above Grade:
 - a. Piping Smaller Than NPS 6: Galvanized steel pipe sleeves.
 - 3. Interior Partitions:
 - a. Piping Smaller Than NPS 6: Galvanized steel pipe sleeves.

SECTION 230518 - ESCUTCHEONS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. One Piece, Cast Brass Type: With [polished, chrome-plated] [and] [rough brass] finish and setscrew fastener.
- B. One Piece, Deep Pattern Type: Deep drawn, box shaped brass with chrome-plated finish and spring clip fasteners.
- C. One Piece, Stamped Steel Type: With chrome-plated finish and spring clip fasteners.
- D. Split Casting Brass Type: With polished, chrome-plated and rough brass finish and with concealed hinge and setscrew.
- E. Split Plate, Stamped Steel Type: With chrome-plated finish, [concealed] [and] [exposed rivet] hinge, and spring clip fasteners.

2.2 FLOOR PLATES

- A. One Piece Floor Plates: Cast-iron flange [with holes for fasteners].
- B. Split Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern type.
 - b. Chrome-Plated Piping: One piece, cast brass or split casting brass type with polished, chrome-plated finish.
 - c. Insulated Piping: One piece, stamped steel type or split plate, stamped steel type with concealed hinge or split plate, stamped steel type with exposed rivet hinge.

- d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass or split casting brass type with polished, chrome-plated finish.
- e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, stamped steel type or split plate, stamped steel type with concealed hinge or split plate, stamped steel type with exposed rivet hinge.
- f. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass or split casting brass type with polished, chrome-plated finish.
- g. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, stamped steel type or split plate, stamped steel type with concealed hinge or split plate, stamped steel type with exposed rivet hinge.
- h. Bare Piping in Unfinished Service Spaces: One piece, cast brass or split casting brass type with polished, chrome-plated.
- i. Bare Piping in Unfinished Service Spaces: One piece, stamped steel type or split plate, stamped steel type with concealed hinge or split plate, stamped steel type with exposed rivet hinge.
- j. Bare Piping in Equipment Rooms: One piece, cast brass or split casting brass type with polished, chrome-plated finish.
- k. Bare Piping in Equipment Rooms: One piece, stamped steel type or split plate, stamped steel type with concealed hinge or split plate, stamped steel type with exposed rivet hinge.
- 2. Escutcheons for Existing Piping:
 - a. Chrome-Plated Piping: Split casting brass type with polished, chrome-plated finish.
 - b. Insulated Piping: Split plate, stamped steel type with concealed or exposed rivet hinge.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casting brass type with polished, chrome-plated finish.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split plate, stamped steel type with concealed or exposed rivet hinge.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting brass type with polished, chrome-plated finish.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: Split plate, stamped steel type with concealed or exposed rivet hinge.
 - g. Bare Piping in Unfinished Service Spaces: Split casting brass type with polished, chrome-plated finish.
 - h. Bare Piping in Unfinished Service Spaces: Split plate, stamped steel type with concealed or exposed rivet hinge.
 - i. Bare Piping in Equipment Rooms: Split casting brass type with polished, chrome-plated finish.
 - j. Bare Piping in Equipment Rooms: Split plate, stamped steel type with concealed or exposed rivet hinge.
- C. Install floor plates for piping penetrations of equipment room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping: One piece, floor plate type.
 - 2. Existing Piping: Split casting, floor plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

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SECTION 230519 - METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Liquid-in-glass thermometers.
 - 2. Thermowells.
 - 3. Dial type pressure gages.
 - 4. Gage attachments.
 - 5. Test plugs.
 - 6. Sight flow indicators.
- B. Related Sections:
 - 1. Division 23 Section "Facility Natural Gas Piping" for gas meters.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Certificates: For each type of meter and gage, from manufacturer.
- C. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 LIQUID-IN-GLASS THERMOMETERS

- A. Metal Case, Industrial Style, Liquid-in-Glass Thermometers:
 - 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. Flo Fab Inc.
 - b. Trerice, H. O. Co.
 - c. Weiss Instruments, Inc.
 - d. Winters Instruments U.S.
 - e. Approved equal
 - 2. Standard: ASME B40.200.
 - 3. Case: Cast aluminum; 7 inch nominal size unless otherwise indicated.
 - 4. Case Form: Adjustable angle unless otherwise indicated.
 - 5. Tube: Glass with magnifying lens and blue or red organic liquid.
 - 6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
 - 7. Window: Glass or plastic.
 - 8. Stem: Aluminum and of length to suit installation.
 - a. Design for Thermowell Installation: Bare stem.
 - 9. Connector: 1-1/4 inches, with ASME B1.1 screw threads.

10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.2 THERMOWELLS

A. Thermowells:

- Standard: ASME B40.200.
- 2. Description: Pressure-tight, socket type fitting made for insertion into piping tee fitting.
- 3. Material for Use with Copper Tubing: CNR or CUNI.
- 4. Material for Use with Steel Piping: CRES.
- 5. Type: Stepped shank unless straight or tapered shank is indicated.
- 6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
- 7. Internal Threads: 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
- 8. Bore: Diameter required to match thermometer bulb or stem.
- 9. Insertion Length: Length required to match thermometer bulb or stem.
- 10. Lagging Extension: Include on thermowells for insulated piping and tubing.
- 11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.
- B. Heat Transfer Medium: Mixture of graphite and glycerin.

2.3 PRESSURE GAGES

- A. Direct Mounted, Metal Case, Dial Type Pressure Gages:
 - 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. AMETEK, Inc.; U.S. Gauge
 - b. Flo Fab Inc.
 - c. Trerice, H. O. Co.
 - d. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
 - e. Weiss Instruments, Inc.
 - f. Winters Instruments U.S.
 - g. Approved equal
 - 2. Standard: ASME B40.100.
 - 3. Case: Liquid-filled type(s); cast aluminum or drawn steel; 4-1/2 inch nominal diameter.
 - 4. Pressure Element Assembly: Bourdon tube unless otherwise indicated.
 - 5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom outlet type unless back outlet type is indicated.
 - 6. Movement: Mechanical, with link to pressure element and connection to pointer.
 - 7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
 - 8. Pointer: Dark colored metal.
 - 9. Window: Glass or plastic.
 - 10. Ring: Metal.
 - 11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.4 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and piston type surge dampening device. Include extension for use on insulated piping.

B. Valves: Brass or stainless steel needle, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads.

2.5 TEST PLUGS

- 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. Flow Design, Inc.
 - 2. Miljoco Corporation
 - 3. National Meter, Inc.
 - 4. Peterson Equipment Co., Inc.
 - 5. Sisco Manufacturing Company, Inc.
 - 6. Trerice, H. O. Co.
 - 7. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
 - 8. Weiss Instruments, Inc.
 - 9. Approved equal
- B. Description: Test station fitting made for insertion into piping tee fitting.
- C. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.
- D. Thread Size: NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe thread.
- E. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.
- F. Core Inserts: Chlorosulfonated polyethylene synthetic and EPDM self-sealing rubber.

2.6 TEST PLUG KITS

- 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. Flow Design, Inc.
 - 2. Miljoco Corporation
 - 3. National Meter, Inc.
 - 4. Peterson Equipment Co., Inc.
 - 5. Sisco Manufacturing Company, Inc.
 - 6. Trerice, H. O. Co.
 - 7. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
 - 8. Weiss Instruments, Inc.
 - 9. Approved equal
- B. Furnish one test plug kit(s) containing one thermometer(s), one pressure gage and adapter, and carrying case. Thermometer sensing elements, pressure gage, and adapter probes shall be of diameter to fit test plugs and of length to project into piping.
- C. Low-Range Thermometer: Small, bimetallic insertion type with 1 to 2 inch diameter dial and tapered end sensing element. Dial range shall be at least 25 to 125 deg F.
- D. Pressure Gage: Small, Bourdon tube insertion type with 2 to 3 inch diameter dial and probe. Dial range shall be at least 0 to 200 psig.
- E. Carrying Case: Metal or plastic, with formed instrument padding.

2.7 SIGHT FLOW INDICATORS

- 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. Archon Industries, Inc.

- 2. Dwyer Instruments, Inc.
- 3. Emerson Process Management; Brooks Instrument
- 4. Ernst Co., John C., Inc.
- 5. Ernst Flow Industries
- 6. KOBOLD Instruments, Inc. USA; KOBOLD Messing GmbH.
- 7. OPW Engineered Systems; a Dover company
- 8. Penberthy; A Brand of Tyco Valves & Controls Prophetstown
- 9. Approved equla
- B. Description: Piping inline installation device for visual verification of flow.
- C. Construction: Bronze or stainless steel body, with sight glass and ball, flapper, or paddle wheel indicator, and threaded or flanged ends.
- D. Minimum Pressure Rating: 150 psig.
- E. Minimum Temperature Rating: 200 deg F.
- F. End Connections for NPS 2 and Smaller: Threaded.
- G. End Connections for NPS 2-1/2 and Larger: Flanged.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.
- B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.
- C. Install thermowells with extension on insulated piping.
- D. Fill thermowells with heat transfer medium.
- E. Install direct mounted thermometers in thermowells and adjust vertical and tilted positions.
- F. Install direct mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.
- G. Install valve and snubber in piping for each pressure gage for fluids.
- H. Install test plugs in piping tees.
- I. Install flow indicators in piping systems in accessible positions for easy viewing.

3.2 CONNECTIONS

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.3 ADJUSTING

A. Adjust faces of meters and gages to proper angle for best visibility.

3.4 THERMOMETER SCALE-RANGE SCHEDULE

- A. Scale Range for Chilled Water Piping: 0 to 250 deg F.
- B. Scale Range for Heating, Hot Water Piping: 0 to 250 deg F.

3.5 PRESSURE GAGE SCALE-RANGE SCHEDULE

- A. Scale Range for Chilled Water Piping: 0 to 100 psi.
- B. Scale Range for Heating, Hot Water Piping: 0 to 100 psi.

END OF SECTION 230519

SECTION 230523 - GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- Bronze ball valves.
- 2. Iron ball valves.
- 3. High performance butterfly valves.
- 4. Bronze swing check valves.
- 5. Iron swing check valves.
- 6. Bronze gate valves.
- 7. Iron gate valves.
- 8. Bronze globe valves.
- 9. Iron globe valves.
- 10. Chainwheels.

B. Related Sections:

- 1. Division 23 HVAC piping Sections for specialty valves applicable to those Sections only.
- 2. Division 23 Section "Identification for HVAC Piping and Equipment" for valve tags and schedules.

1.3 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.

1.4 SUBMITTALS

A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 2. ASME B31.1 for power piping valves.
 - 3. ASME B31.9 for building services piping valves.

1.6 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 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 handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to HVAC valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
 - 1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
 - 2. Handwheel: For valves other than quarter-turn types.
 - 3. Handlever: For quarter-turn valves NPS 6 and smaller.
 - Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.
- E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
 - 1. Gate Valves: With rising stem.
 - 2. Ball Valves: With 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: With extended neck.
- F. Valve End Connections:
 - 1. Flanged: With flanges according to ASME B16.1 for iron valves.
 - 2. Solder Joint: With sockets according to ASME B16.18.
 - 3. Threaded: With threads according to ASME B1.20.1.
- G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

- A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
 - 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. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.

- d. NIBCO INC.
- e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
- 2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig.
 - c. CWP Rating: 600 psig.
 - d. Body Design: Two piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded.
 - g. Seats: PTFE or TFE.
 - h. Stem: Bronze.
 - i. Ball: Chrome-plated brass.
 - j. Port: Full.

2.3 IRON BALL VALVES

- A. Class 125, Iron Ball Valves:
 - 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. American Valve, Inc.
 - b. Conbraco Industries, Inc.; Apollo Valves.
 - c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Description:
 - a. Standard: MSS SP-72.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Split body.
 - d. Body Material: ASTM A 126, gray iron.
 - e. Ends: Flanged.
 - f. Seats: PTFE or TFE.
 - g. Stem: Stainless steel.
 - h. Ball: Stainless steel.
 - i. Port: Full.

2.4 HIGH PERFORMANCE BUTTERFLY VALVES

- A. Class 150, Single Flange, High Performance Butterfly Valves:
 - 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. Bray Controls; a division of Bray International.
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Process Development & Control, Inc.
 - f. Approved equal
 - 2. Description:
 - a. Refer to drawings.

2.5 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:

- 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. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Jenkins Valves.
 - c. Crane Co.; Crane Valve Group; Stockham Division.
 - d. Hammond Valve.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
- 2. Description:
 - a. Standard: MSS SP-80, Type 4.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded.
 - f. Disc: PTFE or TFE.

2.6 IRON SWING CHECK VALVES

- A. Class 125, Iron Swing Check Valves with Metal Seats:
 - 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. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Jenkins Valves.
 - c. Crane Co.: Crane Valve Group: Stockham Division.
 - d. Hammond Valve.
 - e. Legend Valve.
 - f. Milwaukee Valve Company.
 - g. NIBCO INC.
 - h. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Description:
 - a. Standard: MSS SP-71, Type I.
 - b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
 - c. Body Design: Clear or full waterway.
 - d. Body Material: ASTM A 126, gray iron with bolted bonnet.
 - e. Ends: Flanged.
 - f. Trim: Bronze.
 - g. Gasket: Asbestos free.

2.7 BRONZE GATE VALVES

- A. Class 125, NRS Bronze Gate Valves:
 - 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. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Jenkins Valves.
 - c. Crane Co.; Crane Valve Group; Stockham Division.
 - d. Hammond Valve.
 - e. Milwaukee Valve Company.

- f. NIBCO INC.
- Watts Regulator Co.: a division of Watts Water Technologies, Inc. g.
- 2. Description:
 - a. Standard: MSS SP-80, Type 1.
 - CWP Rating: 200 psig. b.
 - Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet. C.
 - Ends: Threaded or solder joint. d.
 - Stem: Bronze. e.
 - f. Disc: Solid wedge; bronze.
 - Packing: Asbestos free. g.
 - Handwheel: Malleable iron bronze, or aluminum. h.

2.8 **IRON GATE VALVES**

- Class 125, NRS, Iron Gate Valves: Α.
 - Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - Crane Co.; Crane Valve Group; Crane Valves.
 - Crane Co.: Crane Valve Group: Jenkins Valves. b.
 - Crane Co.; Crane Valve Group; Stockham Division. C.
 - d. Hammond Valve.
 - Milwaukee Valve Company. e.
 - f. NIBCO INC.
 - Watts Regulator Co.; a division of Watts Water Technologies, Inc. g.
 - 2. Description:
 - Standard: MSS SP-70. Type I.
 - NPS 2-1/2 to NPS 12, CWP Rating: 200 psig. b.
 - Body Material: ASTM A 126, gray iron with bolted bonnet. C.
 - d. Ends: Flanged.
 - Trim: Bronze. e.
 - Disc: Solid wedge. f.
 - Packing and Gasket: Asbestos free.
- B. Class 125, OS&Y, Iron Gate Valves:
 - 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:
 - Crane Co.; Crane Valve Group; Crane Valves.
 - Crane Co.; Crane Valve Group; Jenkins Valves. b.
 - Crane Co.; Crane Valve Group; Stockham Division. C.
 - Hammond Valve. d.
 - Milwaukee Valve Company. e.
 - f. NIBCO INC.
 - Watts Regulator Co.; a division of Watts Water Technologies, Inc. g.
 - 2. Description:
 - a. Standard: MSS SP-70, Type I.
 - NPS 2-1/2 to NPS 12, CWP Rating: 200 psig. b.
 - Body Material: ASTM A 126, gray iron with bolted bonnet. C.
 - d. Ends: Flanged.
 - Trim: Bronze. e.
 - Disc: Solid wedge. f.

g. Packing and Gasket: Asbestos free.

2.9 **BRONZE GLOBE VALVES**

- Class 125, Bronze Globe Valves with Nonmetallic Disc: Α.
 - Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include. but are not limited to, the following:
 - Crane Co.; Crane Valve Group; Crane Valves.
 - Crane Co.; Crane Valve Group; Stockham Division. b.
 - C. NIBCO INC.
 - Red-White Valve Corporation.
 - 2. Description:
 - Standard: MSS SP-80, Type 2.
 - CWP Rating: 200 psig. b.
 - Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet. C.
 - Ends: Threaded or solder joint. d.
 - Stem: Bronze. e.
 - f. Disc: PTFE or TFE.
 - Packing: Asbestos free. g.
 - Handwheel: Malleable iron bronze, or aluminum. h.

2.10 **IRON GLOBE VALVES**

- Α. Class 125, Iron Globe Valves:
 - Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - Crane Co.; Crane Valve Group; Crane Valves.
 - Crane Co.; Crane Valve Group; Jenkins Valves. b.
 - C. Crane Co.; Crane Valve Group; Stockham Division.
 - d. Hammond Valve.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Description:
 - Standard: MSS SP-85, Type I. a.
 - CWP Rating: 200 psig.
 - Body Material: ASTM A 126, gray iron with bolted bonnet. C.
 - Ends: Flanged. d.
 - Trim: Bronze. e.
 - Packing and Gasket: Asbestos free. f.

2.11 **CHAINWHEELS**

- Manufacturers: Subject to compliance with requirements, available manufacturers Α. offering products that may be incorporated into the Work include, but are not limited to, the following:
 - Babbitt Steam Specialty Co. 1.
 - Roto Hammer Industries. 2.
 - 3. Trumbull Industries.
- Description: Valve actuation assembly with sprocket rim, brackets, and chain. В. 230523 - 6

- 1. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
- 2. Attachment: For connection to butterfly valve stems.
- 3. Sprocket Rim with Chain Guides: Ductile or cast iron, of type and size required for valve.
- 4. Chain: Hot-dip, galvanized steel, of size required to fit sprocket rim.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install chainwheels on operators for butterfly and gate valves NPS 4 and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor.
- F. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.

3.3 ADJUSTING

A. 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.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball, butterfly or gate valves.
 - 2. Butterfly Valve Dead End Service: Single flange (lug) type.
 - 3. Throttling Service except Steam: Globe or butterfly valves.
 - 4. Pump-Discharge Check Valves:
 - a. NPS 2 and Smaller: Bronze swing check valves with nonmetallic disc.
 - b. NPS 2-1/2 and Larger: Iron swing check valves with lever and weight or with spring or iron, center guided, metal seat check valves.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
- C. Select valves, except wafer types, with the following end connections:

- 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder joint valve end option is indicated in valve schedules below.
- 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve end option is indicated in valve schedules below.
- 3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
- 4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
- 5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve end option is indicated in valve schedules below.
- 6. For Steel Piping, NPS 5 and Larger: Flanged ends.

3.5 CHILLED, HEATING, AND DUAL TEMPERATURE WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
 - 1. Bronze Valves: May be provided with solder joint ends instead of threaded ends.
 - 2. Ball Valves: Two piece, full port, bronze with bronze trim.
 - 3. Bronze Swing Check Valves: Class 125 nonmetallic disc.
 - 4. Bronze Gate Valves: Class 125 NRS, bronze.
 - 5. Bronze Globe Valves: Class 125 nonmetallic disc.
- B. Pipe NPS 2-1/2 and Larger:
 - 1. Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.
 - 2. Iron Ball Valves, NPS 2-1/2 to NPS 10: Class 150.
 - 3. High Performance Butterfly Valves: Class 150, single flange.
 - 4. Iron Swing Check Valves: Class 125, metal seats.
 - 5. Iron Gate Valves: Class 125 OS&Y.
 - 6. Iron Globe Valves: Class 125.

END OF SECTION 230523

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - Metal pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Thermal hanger shield inserts.
 - 4. Fastener systems.
 - 5. Pipe stands.
 - 6. Equipment supports.
- B. Related Sections:
 - 1. Division 05 Section "Metal Fabrications" for structural steel shapes and plates for trapeze hangers for pipe and equipment supports.
 - 2. Division 23 Section "Expansion Fittings and Loops for HVAC Piping" for pipe guides and anchors.
 - 3. Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment" for vibration isolation devices.
 - 4. Division 23 Section(s) "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:
 - 1. Trapeze pipe hangers.
 - 2. Metal framing systems.
 - 3. Pipe stands.
 - 4. Equipment supports.

- C. Delegated-Design Submittal: For trapeze hangers 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. Detail fabrication and assembly of trapeze hangers.
 - 2. Design Calculations: Calculate requirements for designing trapeze hangers.
- D. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
 - 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
- B. Copper Pipe Hangers:
 - 1. Description: MSS SP-58, Types 1 through 58, copper-coated steel, factory-fabricated components.
 - 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop or field-fabricated pipe support assembly made from structural carbon steel shapes with MSS SP-58 carbon steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL HANGER SHIELD INSERTS

- 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. Carpenter & Paterson, Inc.
 - 2. Clement Support Services
 - 3. ERICO International Corporation
 - 4. National Pipe Hanger Corporation
 - 5. PHS Industries, Inc.
 - 6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
 - 7. Piping Technology & Products, Inc.
 - 8. Rilco Manufacturing Co., Inc.
 - 9. Value Engineered Products, Inc.
- B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100 psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125 psig minimum compressive strength and vapor barrier.

- C. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass with 100 psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125 psig minimum compressive strength.
- D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical Expansion Anchors: Insert-wedge type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 PIPE STANDS

- A. General Requirements for Pipe Stands: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support floor-mounted piping.
- B. High Type, Multiple Pipe Stand:
 - 1. Bases: One or more; plastic.
 - 2. Vertical Members: Two or more protective-coated steel channels.
 - 3. Horizontal Member: Protective-coated steel channel.
 - 4. Pipe Supports: Galvanized steel, clevis-type pipe hangers.

2.6 EQUIPMENT SUPPORTS

A. Description: Welded, shop or field-fabricated equipment support made from structural carbon steel shapes.

2.7 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000 psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

- 2. Field fabricate from ASTM A 36/A 36M, carbon steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Thermal Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- D. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 - 2. Install mechanical expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- F. Equipment Support Installation: Fabricate from welded-structural steel shapes.
- G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- H. Install lateral bracing with pipe hangers and supports to prevent swaying.
- I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 <and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- L. Insulated Piping:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal hanger shield inserts may be used. Include steel weight distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal hanger shield inserts may be used. Include steel weight distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - 5. Thermal Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural steel stands to suspend equipment from structure overhead.
- B. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and 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. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.
- F. Use copper-plated pipe hangers for uninsulated copper piping and tubing.
- G. Use padded hangers for piping that is subject to scratching.
- H. Use thermal hanger shield inserts for insulated piping and tubing.

- I. Horizontal Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
 - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F,pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
 - 3. Carbon- or Alloy steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
 - 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
 - 5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 6. Adjustable, Swivel Split or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
 - 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
 - 11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
 - 12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
 - 13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 - 14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel pipe base stanchion support and cast iron floor flange or carbon steel plate.
 - 15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel pipe base stanchion support and cast iron floor flange or carbon steel plate, and with U-bolt to retain pipe.
 - 16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel pipe base stanchion support and cast iron floor flange.
 - 17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur
 - 18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
 - 19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
 - 20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.

- 21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- J. Vertical Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
 - 2. Carbon- or Alloy steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- K. Hanger Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 - 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 - 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 - 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 - 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 - 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
 - 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 - 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams
 - 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 - 6. C-Clamps (MSS Type 23): For structural shapes.
 - 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 - 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 - 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 - 10. Linked steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 - 11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 - 12. Welded Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 - 13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 - 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 - 15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

- M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel Pipe Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 - 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 - 3. Thermal Hanger Shield Inserts: For supporting insulated pipe.
- N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 - 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
 - 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
 - 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 - 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
 - 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
 - 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
 - 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - a. Horizontal (MSS Type 54): Mounted horizontally.
 - b. Vertical (MSS Type 55): Mounted vertically.
 - c. Trapeze (MSS Type 56): Two vertical type supports and one trapeze member.
- O. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- Q. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 230529

SECTION 230548 - VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Isolation pads.
 - 2. Isolation mounts.
 - 3. Freestanding spring isolators.
 - 4. Elastomeric hangers.
 - 5. Spring hangers.
 - 6. Steel, vibration isolation equipment bases.

1.3 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - Include rated load, rated deflection, and overload capacity for each vibration isolation device.
- B. Coordination Drawings: Show coordination of seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.
- C. Welding certificates.
- D. Field quality control test reports.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Ace Mountings Co., Inc.
 - 2. Amber/Booth Company, Inc.
 - 3. California Dynamics Corporation
 - 4. Isolation Technology, Inc.
 - 5. Kinetics Noise Control

- 6. Mason Industries
- 7. Vibration Eliminator Co., Inc.
- 8. Vibration Isolation.
- 9. Vibration Mountings & Controls, Inc.
- B. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - 1. Resilient Material: Oil and water resistant neoprene.
- C. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.
 - Materials: Cast-ductile iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - 2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.
- D. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
 - 1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig.
 - 6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
- E. Elastomeric Hangers: Single or double-deflection type, fitted with molded, oil-resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Color code or otherwise identify to indicate capacity range.
- F. Spring Hangers: Combination coil spring and elastomeric-insert hanger with spring and insert in compression.
 - Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 - 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel washer reinforced cup to support spring and bushing projecting through bottom of frame.
 - 7. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

2.2 VIBRATION ISOLATION EQUIPMENT BASES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Amber/Booth Company, Inc.
 - 2. California Dynamics Corporation
 - 3. Isolation Technology, Inc.
 - 4. Kinetics Noise Control
 - 5. Mason Industries
 - 6. Vibration Eliminator Co., Inc.
 - 7. Vibration Isolation
 - 8. Vibration Mountings & Controls, Inc.
- B. Steel Base: Factory-fabricated, welded, structural steel bases and rails.
 - Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
 - a. Include supports for suction and discharge elbows for pumps.
 - 2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
 - 3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

2.3 FACTORY FINISHES

- A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 - 1. Powder coating on springs and housings.
 - 2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 - 3. Baked enamel or powder coat for metal components on isolators for interior use.
 - 4. Color code or otherwise mark vibration isolation control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install spring hangers without binding.
- B. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.
- C. Connect wiring to isolated equipment with flexible hanging loop.

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3.3 ADJUSTING

- A. Adjust isolators after piping system is at operating weight.
- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Adjust active height of spring isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.
- 3.4 HVAC VIBRATION CONTROL AND SEISMIC RESTRAINT DEVICE SCHEDULE
 - A. Refer to details and schedules on drawings for types and locations.

END OF SECTION 230548

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.
 - 4. Stencils.
 - 5. Valve tags.
 - 6. Warning tags.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
 - 2. Letter Color: White.
 - 3. Background Color: Black.
 - 4. Maximum Temperature: Able to withstand temperatures up to 250 deg F.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 - 6. Minimum Letter Size: 1/2 inch
 - 7. Fasteners: Stainless steel rivets or self-tapping screws.
 - 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's unique equipment number.

2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch] thick, and having predrilled holes for attachment hardware.
- B. Letter Color: White.
- C. Background Color: Red.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/2 inch
- G. Fasteners: Stainless steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, and an arrow indicating flow direction.
 - Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

2.4 STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/4 inches for ducts; and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.
 - 1. Stencil Material: Fiberboard or metal.
 - 2. Stencil Paint: Exterior, gloss, acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray can form.
 - 3. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated.

2.5 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4 inch letters for piping system abbreviation and 1/2 inch numbers.
 - 1. Tag Material: Brass, 0.032 inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire link or beaded chain; or S-hook.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11 inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: 3 by 5-1/4 inches minimum.
 - 2. Fasteners: Reinforced grommet and wire or string.
 - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 - 4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

- A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

3.4 DUCT LABEL INSTALLATION

- A. Stenciled Duct Label Option: Stenciled labels, showing service and flow direction.
- B. Locate labels on ductwork in penthouses only.

3.5 VALVE TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve Tag Size and Shape:
 - a. 1-1/2 inches round.
 - 2. Valve Tag Color:
 - a. Natural

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- 3. Letter Color:
 - a. Black
- 3.6 WARNING TAG INSTALLATION
 - A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Balancing Air Systems:
 - a. Constant-volume air systems.
 - b. Variable air volume systems.
 - 2. Balancing Hydronic Piping Systems:
 - a. Constant-flow hydronic systems.
 - b. Variable-flow hydronic systems.
 - c. Primary-secondary hydronic systems.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 SUBMITTALS

- A. Qualification Data: Within 45 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Certified TAB reports.
- C. Sample report forms.
- D. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.
 - 2. Serial number.
 - 3. Application.
 - 4. Dates of use.
 - 5. Dates of calibration.

1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC, NEBB, or TABB.
 - 1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC, NEBB, or TABB.
 - 2. TAB Technician: Employee of the TAB contractor and who is certified by AABC, NEBB, or TABB as a TAB technician.
- B. TAB Conference: Meet with Construction Manager and Commissioning Authority on approval of the TAB strategies and procedures plan to develop a mutual understanding

of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.

- 1. Agenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Coordination and cooperation of trades and subcontractors.
 - d. Coordination of documentation and communication flow.
- C. TAB Report Forms: Use standard TAB contractor's forms approved by Engineer and Commissioning Authority.
- D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.6 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

- A. Notice: Provide three days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 TAB SPECIALISTS

- A. Subject to compliance with requirements, available TAB contractors that may be engaged include, but are not limited to, the following:
 - 1. dL FlowTech Inc.
 - 2. Approved Equal.

3.2 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan and pump curves.
- F. Examine system and equipment installations and verify that field quality control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

- I. Examine terminal units, such as variable air volume boxes, and verify that they are accessible and their controls are connected and functioning.
- J. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.
- K. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.
- L. Examine heat transfer coils for correct piping connections and for clean and straight fins
- M. Examine system pumps to ensure absence of entrained air in the suction piping.
- N. Examine operating safety interlocks and controls on HVAC equipment.
- O. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 PREPARATION

- A. Complete system readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical power wiring is complete.
 - 2. Hydronic systems are filled, clean, and free of air.
 - 3. Automatic temperature control systems are operational.
 - 4. Equipment and duct access doors are securely closed.
 - 5. Balance and fire dampers are open.
 - 6. Isolating and balancing valves are open and control valves are operational.
 - 7. Ceilings are installed in critical areas where air pattern adjustments are required and access to balancing devices is provided.
 - 8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", NEBB's "Procedural Standards for Testing, Adjusting,
 - and Balancing of Environmental Systems", or SMACNA's "HVAC Systems Testing, Adjusting, and Balancing" and in this Section.
 - 1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Division 23 Section, "Air Duct Accessories."
 - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section, "HVAC Insulation."
- C. Mark equipment and balancing devices, including damper control positions, valve position indicators, fan speed control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable air volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- E. Check airflow patterns from the outdoor air louvers and dampers and the return and exhaust air dampers through the supply fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air handling unit components.
- L. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."

3.6 PROCEDURES FOR CONSTANT VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - d. Measure inlet static pressure of double inlet fans through the wall of the plenum that houses the fan.
 - 3. Measure static pressure across each component that makes up an air handling unit, rooftop unit, and other air handling and treating equipment.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 - 4. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system effect factors. Recommend adjustments to accommodate actual conditions.
 - 5. Do not make fan speed adjustments that result in motor overload. Consult equipment manufacturers about fan speed safety factors. Modulate dampers and measure fan motor amperage to ensure that no overload will occur. Measure amperage in full cooling, full heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - 1. Measure airflow of submain and branch ducts.

- a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
- 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
- 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.
 - 1. Measure terminal outlets using a direct reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
 - 1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 - 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.7 PROCEDURES FOR VARIABLE AIR VOLUME SYSTEMS

- A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum setpoint airflow with the remainder at maximum airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced airflow terminal units so they are distributed evenly among the branch ducts.
- B. Pressure Independent, Variable Air Volume Systems: After the fan systems have been adjusted, adjust the variable air volume systems as follows:
 - 1. Set outdoor air dampers at minimum, and set return and exhaust air dampers at a position that simulates full cooling load.
 - Select the terminal unit that is most critical to the supply fan airflow and static
 pressure. Measure static pressure. Adjust system static pressure so the entering
 static pressure for the critical terminal unit is not less than the sum of the terminal
 unit manufacturer's recommended minimum inlet static pressure plus the static
 pressure needed to overcome terminal unit discharge system losses.
 - 3. Measure total system airflow. Adjust to within indicated airflow.
 - 4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constantvolume air systems.
 - 5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.
 - a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.
 - 6. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
 - a. Adjust the fan and balance the return air ducts and inlets the same as described for constant-volume air systems.

- 7. Measure static pressure at the most critical terminal unit and adjust the static pressure controller at the main supply air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
- 8. Record final fan performance data.

3.8 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.
- B. Prepare schematic diagrams of systems' "as-built" piping layouts.
- C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:
 - 1. Open all manual valves for maximum flow.
 - 2. Check liquid level in expansion tank.
 - 3. Check makeup water station pressure gage for adequate pressure for highest vent.
 - 4. Check flow control valves for specified sequence of operation, and set at indicated flow.
 - 5. Set differential pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive displacement type unless several terminal valves are kept open.
 - 6. Set system controls so automatic valves are wide open to heat exchangers.
 - 7. Check pump motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
 - 8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.9 PROCEDURES FOR CONSTANT FLOW HYDRONIC SYSTEMS

- A. Measure water flow at pumps. Use the following procedures except for positive displacement pumps:
 - 1. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
 - 2. Check system resistance. With all valves open, read pressure differential across the pump and mark pump manufacturer's head-capacity curve. Adjust pump discharge valve until indicated water flow is achieved.
 - a. Monitor motor performance during procedures and do not operate motors in overload conditions.
 - 3. Verify pump motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.
 - 4. Report flow rates that are not within plus or minus 10 percent of design.
- B. Measure flow at all new automatic flow control valves to verify that valves are functioning as designed.
- C. Measure flow at all new pressure-independent characterized control valves, with valves in fully open position, to verify that valves are functioning as designed.
- D. Set calibrated balancing valves, if installed, at calculated presettings.

- E. Measure flow at all stations and adjust, where necessary, to obtain first balance.
 - 1. System components that have Cv rating or an accurately cataloged flow pressure drop relationship may be used as a flow indicating device.
- F. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.
- G. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:
 - 1. Determine the balancing station with the highest percentage over indicated flow.
 - 2. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
 - 3. Record settings and mark balancing devices.
- H. Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures including outdoor air temperature.
- I. Measure the differential pressure control valve settings existing at the conclusion of balancing.
- J. Check settings and operation of each safety valve. Record settings.

3.10 PROCEDURES FOR VARIABLE FLOW HYDRONIC SYSTEMS

A. Balance systems with automatic two and three-way control valves by setting systems at maximum flow through heat exchange terminals and proceed as specified above for hydronic systems.

3.11 PROCEDURES FOR PRIMARY-SECONDARY HYDRONIC SYSTEMS

A. Balance the primary circuit flow first and then balance the secondary circuits.

3.12 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - 1. Manufacturer's name, model number, and serial number.
 - 2. Motor horsepower rating.
 - 3. Motor rpm.
 - 4. Efficiency rating.
 - 5. Nameplate and measured voltage, each phase.
 - 6. Nameplate and measured amperage, each phase.
 - 7. Starter thermal protection element rating.
- B. Motors Driven by Variable Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.13 PROCEDURES FOR CONDENSING UNITS

- A. Verify proper rotation of fans.
- B. Measure entering and leaving air temperatures.
- C. Record compressor data.

3.14 PROCEDURES FOR HEAT TRANSFER COILS

- A. Measure, adjust, and record the following data for each water coil:
 - 1. Entering and leaving water temperature.
 - 2. Water flow rate.

- 3. Water pressure drop.
- 4. Dry bulb temperature of entering and leaving air.
- 5. Wet bulb temperature of entering and leaving air for cooling coils.
- 6. Airflow.
- 7. Air pressure drop.
- B. Measure, adjust, and record the following data for each refrigerant coil:
 - 1. Dry bulb temperature of entering and leaving air.
 - 2. Wet bulb temperature of entering and leaving air.
 - 3. Airflow.
 - 4. Air pressure drop.
 - 5. Refrigerant suction pressure and temperature.

3.15 TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 - 2. Air Outlets and Inlets: Plus or minus 10 percent.
 - 3. Heating Water Flow Rate: Plus or minus 10 percent.
 - 4. Cooling Water Flow Rate: Plus or minus 10 percent.

3.16 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field report data, include the following:
 - 1. Pump curves.
 - 2. Fan curves.
 - 3. Manufacturers' test data.
 - 4. Field test reports prepared by system and equipment installers.
 - 5. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
 - 1. Title page.
 - 2. Name and address of the TAB contractor.
 - 3. Project name.
 - 4. Project location.
 - 5. Architect's name and address.
 - 6. Engineer's name and address.
 - 7. Contractor's name and address.
 - 8. Report date.
 - 9. Signature of TAB supervisor who certifies the report.
 - 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 - 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.

- 12. Nomenclature sheets for each item of equipment.
- 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
- 14. Notes to explain why certain final data in the body of reports vary from indicated values.
- 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet and dry bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable air volume systems.
 - g. Settings for supply air, static pressure controller.
 - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single line diagram and include the following:
 - 1. Quantities of outdoor, supply, return, and exhaust airflows.
 - 2. Water and steam flow rates.
 - 3. Duct, outlet, and inlet sizes.
 - 4. Pipe and valve sizes and locations.
 - 5. Terminal units.
 - 6. Balancing stations.
 - 7. Position of balancing devices.
- E. Fan Coil Units Test Reports: For units with coils, include the following:
 - Unit Data:
 - Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. Number, type, and size of filters.
 - 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - 3. Test Data (Indicated and Actual Values):
 - a. Total air flow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.

- e. Filter static pressure differential in inches wg.
- f. Cooling coil static pressure differential in inches wg.
- g. Heating coil static pressure differential in inches wg.
- h. Outdoor airflow in cfm.
- i. Return airflow in cfm.
- j. Outdoor air damper position.
- k. Return air damper position.
- I. Exhaust air damper position.
- F. Apparatus Coil Test Reports:
 - 1. Coil Data:
 - a. System identification.
 - b. Location.
 - c. Coil type.
 - d. Number of rows.
 - e. Fin spacing in fins per inch o.c.
 - f. Make and model number.
 - g. Face area in sq. ft.
 - h. Tube size in NPS.
 - i. Tube and fin materials.
 - j. Circuiting arrangement.
 - 2. Test Data (Indicated and Actual Values):
 - a. Air flow rate in cfm.
 - b. Average face velocity in fpm.
 - c. Air pressure drop in inches wg.
 - d. Outdoor air, wet and dry bulb temperatures in deg F.
 - e. Return air, wet and dry bulb temperatures in deg F.
 - f. Entering air, wet and dry bulb temperatures in deg F.
 - g. Leaving air, wet and dry bulb temperatures in deg F.
 - h. Water flow rate in gpm.
 - i. Water pressure differential in feet of head or psig.
 - j. Entering water temperature in deg F.
 - k. Leaving water temperature in deg F.
 - I. Refrigerant expansion valve and refrigerant types.
 - m. Refrigerant suction pressure in psig.
 - n. Refrigerant suction temperature in deg F.
- G. Fan Test Reports: For supply, return and exhaust fans, include the following:
 - 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.

- d. Full load amperage and service factor.
- e. Sheave make, size in inches, and bore.
- f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
- g. Number, make, and size of belts.
- 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- H. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross section and record the following:
 - 1. Report Data:
 - a. System and air handling unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft.
 - g. Indicated air flow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual air flow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
 - I. Supply, return and exhaust inlets/outlets indicated air flow rate in cfm.
 - m. Supply, return and exhaust inlets/outlets actual air flow rate in cfm.
- I. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:
 - 1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Service.
 - d. Make and size.
 - e. Model number and serial number.
 - f. Water flow rate in gpm.
 - g. Water pressure differential in feet of head or psig.
 - h. Required net positive suction head in feet of head or psig.
 - i. Pump rpm.
 - j. Impeller diameter in inches.
 - k. Motor make and frame size.
 - I. Motor horsepower and rpm.
 - m. Voltage at each connection.
 - n. Amperage for each phase.
 - o. Full load amperage and service factor.
 - p. Seal type.
 - 2. Test Data (Indicated and Actual Values):
 - a. Static head in feet of head or psig.
 - b. Pump shutoff pressure in feet of head or psig.
 - c. Actual impeller size in inches.

- d. Full open flow rate in gpm.
- e. Full open pressure in feet of head or psig.
- f. Final discharge pressure in feet of head or psig.
- g. Final suction pressure in feet of head or psig.
- h. Final total pressure in feet of head or psig.
- i. Final water flow rate in gpm.
- j. Voltage at each connection.
- k. Amperage for each phase.
- J. Air Terminal Device Reports:
 - 1. Unit Data:
 - a. System and air handling unit identification.
 - b. Location and zone.
 - c. Apparatus used for test.
 - d. Area served.
 - e. Make.
 - f. Number from system diagram.
 - g. Type and model number.
 - h. Size.
 - i. Effective area in sq. ft.
 - 2. Test Data (Indicated and Actual Values):
 - a. Air flow rate in cfm.
 - b. Air velocity in fpm.
 - c. Preliminary air flow rate as needed in cfm.
 - d. Preliminary velocity as needed in fpm.
 - e. Final air flow rate in cfm.
 - f. Final velocity in fpm.
 - g. Space temperature in deg F.
- K. Instrument Calibration Reports:
 - 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.17 INSPECTIONS

- A. Initial Inspection:
 - 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
 - 2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure water flow of at least 5 percent of terminals.
 - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - d. Verify that balancing devices are marked with final balance position.
 - e. Note deviations from the Contract Documents in the final report.
- B. Final Inspection:
 - After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final

- report, request that a final inspection be made by Engineer and Commissioning Authority.
- 2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Commissioning Authority.
- 3. Commissioning Authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
- 4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- 5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- C. See Division 01 Section "Quality Requirements" for retesting and reinspecting requirements and Division 01 Section "Execution" for requirements for correcting the Work.
- D. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
 - Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 - 2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.
- E. Prepare test and inspection reports.

3.18 ADDITIONAL TESTS

- A. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.
- B. Refer to Section 230800 "Commissioning of HVAC" for project commissioning requirements.

END OF SECTION 230593

SECTION 230700 - HVAC INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - Insulation Materials:
 - a. Cellular glass.
 - b. Flexible elastomeric.
 - c. Mineral fiber.
 - d. Polyisocyanurate.
 - 2. Insulating cements.
 - Adhesives.
 - 4. Mastics.
 - 5. Lagging adhesives.
 - 6. Sealants.
 - 7. Factory-applied jackets.
 - 8. Field-applied jackets.
 - 9. Tapes.
 - 10. Securements.
 - 11. Corner angles.
- B. Related Sections:
 - 1. Division 22 Section "Plumbing Insulation."
 - 2. Division 23 Section "Metal Ducts" for duct liners.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).
- B. Shop Drawings:
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail attachment and covering of heat tracing inside insulation.
 - 3. Detail insulation application at pipe expansion joints for each type of insulation.
 - 4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 - 5. Detail removable insulation at piping specialties, equipment connections, and access panels.
 - 6. Detail application of field-applied jackets.
 - 7. Detail application at linkages of control devices.
 - 8. Detail field application for each equipment type.
- C. Qualification Data: For qualified Installer.
- D. Field quality control reports.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire Test Response Characteristics: Insulation and related materials shall have fire test response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame spread index of 75 or less, and smokedeveloped index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Flexible Elastomeric: Closed cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - 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. Aeroflex USA Inc.; Aerocel.
- b. Armacell LLC; AP Armaflex.
- c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.
- G. Mineral Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; Duct Wrap.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Duct Wrap.
 - d. Manson Insulation Inc.; Alley Wrap.
 - e. Owens Corning; All-Service Duct Wrap.
- H. Mineral Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ. For equipment applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; Commercial Board.
 - b. Fibrex Insulations Inc.; FBX.
 - c. Johns Manville; 800 Series Spin-Glas.
 - d. Knauf Insulation: Insulation Board.
 - e. Manson Insulation Inc.: AK Board.
 - f. Owens Corning; Fiberglas 700 Series.
- I. Mineral Fiber, Preformed Pipe Insulation:
 - 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. Fibrex Insulations Inc.; Coreplus 1200.
 - b. Johns Manville; Micro-Lok.
 - c. Knauf Insulation; 1000 Pipe Insulation.
 - d. Manson Insulation Inc.; Alley-K.
 - e. Owens Corning; Fiberglas Pipe Insulation.
 - 2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- J. Mineral Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.27 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; CrimpWrap.
 - b. Johns Manville; MicroFlex.
 - c. Knauf Insulation; Pipe and Tank Insulation.

- d. Manson Insulation Inc.; AK Flex.
- e. Owens Corning; Fiberglas Pipe and Tank Insulation.
- K. Polyisocyanurate: Unfaced, preformed, rigid cellular polyisocyanurate material intended for use as thermal insulation.
 - 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. Apache Products Company; ISO-25.
 - b. Dow Chemical Company (The); Trymer.
 - c. Duna USA Inc.; Corafoam.
 - d. Elliott Company; Elfoam.
 - 2. Comply with ASTM C 591, Type I or Type IV, except thermal conductivity (k-value) shall not exceed 0.19 Btu x in./h x sq. ft. x deg F at 75 deg F after 180 days of aging.
 - 3. Flame spread index shall be 25 or less and smoke developed index shall be 50 or less for thickness up to 1-1/2 inches as tested by ASTM E 84.
 - 4. Fabricate shapes according to ASTM C 450 and ASTM C 585.

2.2 INSULATING CEMENTS

- A. Mineral Fiber Insulating Cement: Comply with ASTM C 195.
 - 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. Insulco, Division of MFS, Inc.; Triple I.
 - b. P. K. Insulation Mfg. Co., Inc.; Super-Stik.
- B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.
 - 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. P. K. Insulation Mfg. Co., Inc.; Thermal-V-Kote.
- C. Mineral Fiber, Hydraulic Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
 - 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. Insulco, Division of MFS, Inc.; SmoothKote.
 - b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
 - c. Rock Wool Manufacturing Company; Delta One Shot.

2.3 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class 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. Aeroflex USA Inc.; Aeroseal.
 - b. Armacell LCC; 520 Adhesive.
 - c. Foster Products Corporation, H. B. Fuller Company; 85-75.
 - d. RBX Corporation; Rubatex Contact Adhesive.
 - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Mineral Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade 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. Childers Products, Division of ITW; CP-82.
- b. Foster Products Corporation, H. B. Fuller Company; 85-20.
- c. ITW TACC, Division of Illinois Tool Works; S-90/80.
- d. Marathon Industries, Inc.; 225.
- e. Mon-Eco Industries, Inc.; 22-25.
- 2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. ASJ Adhesive, and FSK jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 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. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
 - d. Marathon Industries, Inc.; 225.
 - e. Mon-Eco Industries, Inc.; 22-25.
 - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. PVC Jacket Adhesive: Compatible with PVC jacket.
 - 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 Chemical Company (The); 739, Dow Silicone.
 - b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
 - c. P.I.C. Plastics, Inc.; Welding Adhesive.
 - d. Speedline Corporation: Speedline Vinvl Adhesive.
 - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- F. Polyisocyanurate Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.
 - 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. Childers Products, Division of ITW; CP-96.
 - b. Foster Products Corporation, H. B. Fuller Company; 81-33.
 - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
 - For indoor applications, use mastics that have a VOC content of <Insert value> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Vapor Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
 - 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. Childers Products, Division of ITW; CP-35.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-90.
 - c. ITW TACC, Division of Illinois Tool Works; CB-50.

- d. Marathon Industries, Inc.; 590.
- e. Mon-Eco Industries, Inc.; 55-40.
- f. Vimasco Corporation; 749.
- 2. Water Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
- 3. Service Temperature Range: Minus 20 to plus 180 deg F.
- 4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
- 5. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 - 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. Childers Products, Division of ITW; CP-10.
 - b. Foster Products Corporation, H. B. Fuller Company; 35-00.
 - c. ITW TACC, Division of Illinois Tool Works; CB-05/15.
 - d. Marathon Industries, Inc.; 550.
 - e. Mon-Eco Industries, Inc.; 55-50.
 - f. Vimasco Corporation; WC-1/WC-5.
 - 2. Water Vapor Permeance: ASTM F 1249, 3 perms at 0.0625 inch dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 200 deg F.
 - 4. Solids Content: 63 percent by volume and 73 percent by weight.
 - 5. Color: White.

2.5 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
 - For indoor applications, use lagging adhesives that have a VOC content of <Insert value> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Products, Division of ITW; CP-52.
 - b. Foster Products Corporation, H. B. Fuller Company; 81-42.
 - c. Marathon Industries, Inc.; 130.
 - d. Mon-Eco Industries, Inc.; 11-30.
 - 3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct, equipment, and pipe insulation.
 - 4. Service Temperature Range: Minus 50 to plus 180 deg F.
 - Color: White.

2.6 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
 - 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. Childers Products, Division of ITW; CP-76-8.
 - b. Foster Products Corporation, H. B. Fuller Company; 95-44.
 - c. Marathon Industries, Inc.; 405.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Vimasco Corporation; 750.

- 2. Materials shall be compatible with insulation materials, jackets, and substrates.
- 3. Fire- and water-resistant, flexible, elastomeric sealant.
- 4. Service Temperature Range: Minus 40 to plus 250 deg F.
- 5. Color: Aluminum.
- 6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. ASJ Flashing Sealants, and PVC Jacket Flashing Sealants:
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - Childers Products, Division of ITW; CP-76.
 - 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 3. Fire- and water-resistant, flexible, elastomeric sealant.
 - 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 5. Color: White.
 - 6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Joint Sealants:

- 1. Joint Sealants for Polyisocyanurate Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Products, Division of ITW; CP-76.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-45.
 - c. Marathon Industries, Inc.; 405.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Pittsburgh Corning Corporation; Pittseal 444.
 - f. Vimasco Corporation: 750.

2.7 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum foil backing; complying with ASTM C 1136, Type I.
 - 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 - 3. FSK Jacket: Aluminum foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 - 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. Johns Manville; Zeston.
 - b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto PVC Corporation; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.
 - 2. Adhesive: As recommended by jacket material manufacturer.

- 3. Color: White.
- 4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short and long radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
- 5. Factory-fabricated tank heads and tank side panels.

C. Metal Jacket:

- 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. Childers Products, Division of ITW; Metal Jacketing Systems.
 - b. PABCO Metals Corporation; Surefit.
 - c. RPR Products, Inc.; Insul-Mate.
- 2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105 or 5005, Temper H-14.
 - a. Factory cut and rolled to size.
 - b. Finish and thickness are indicated in field-applied jacket schedules.
 - c. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.
 - 2) Preformed 2-piece or gore, 45- and 90-degree, short and long radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.
 - 5) End caps.
 - 6) Beveled collars.
 - 7) Valve covers.
 - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.9 TAPES

- A. ASJ Tape: White vapor retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 - 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. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
 - b. Compac Corp.; 104 and 105.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
 - 2. Width: 3 inches.
 - 3. Thickness: 11.5 mils.
 - 4. Adhesion: 90 ounces force/inch in width.
 - 5. Elongation: 2 percent.
 - 6. Tensile Strength: 40 lbf/inch in width.
 - 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil face, vapor retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
 - 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. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
 - b. Compac Corp.; 110 and 111.

- c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
- d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
- 2. Width: 3 inches.
- 3. Thickness: 6.5 mils.
- 4. Adhesion: 90 ounces force/inch in width.
- 5. Elongation: 2 percent.
- 6. Tensile Strength: 40 lbf/inch in width.
- 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. PVC Tape: White vapor retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
 - 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. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
 - b. Compac Corp.; 130.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
 - d. Venture Tape; 1506 CW NS.
 - 2. Width: 2 inches.
 - 3. Thickness: 6 mils.
 - 4. Adhesion: 64 ounces force/inch in width.
 - 5. Elongation: 500 percent.
 - 6. Tensile Strength: 18 lbf/inch in width.
- D. Aluminum Foil Tape: Vapor retarder tape with acrylic adhesive.
 - 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. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
 - b. Compac Corp.: 120.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 488 AWF.
 - d. Venture Tape; 3520 CW.
 - 2. Width: 2 inches.
 - 3. Thickness: 3.7 mils.
 - 4. Adhesion: 100 ounces force/inch in width.
 - 5. Elongation: 5 percent.
 - 6. Tensile Strength: 34 lbf/inch in width.

2.10 SECUREMENTS

A. Bands:

- 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. Childers Products; Bands.
 - b. PABCO Metals Corporation: Bands.
 - c. RPR Products, Inc.; Bands.
- 2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 3/4 inch wide with wing or closed seal.
- 3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing or closed seal.
- 4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
- B. Insulation Pins and Hangers:

- 1. Capacitor Discharge Weld Pins: Copper or zinc-coated steel pin, fully annealed for capacitor discharge welding, 0.106 inch diameter shank, length to suit depth of insulation indicated.
 - 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) AGM Industries, Inc.; CWP-1.
 - 2) GEMCO; CD.
 - 3) Midwest Fasteners, Inc.; CD.
 - 4) Nelson Stud Welding; TPA, TPC, and TPS.
- 2. Cupped Head, Capacitor Discharge Weld Pins: Copper or zinc-coated steel pin, fully annealed for capacitor discharge welding, 0.106 inch diameter shank, length to suit depth of insulation indicated with integral 1-1/2 inch galvanized carbon-steel washer.
 - 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) AGM Industries, Inc.; CWP-1.
 - 2) GEMCO; Cupped Head Weld Pin.
 - 3) Midwest Fasteners, Inc.; Cupped Head.
 - 4) Nelson Stud Welding; CHP.
- 3. Metal, Adhesively Attached, Perforated Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - 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) AGM Industries, Inc.; Tactoo Insul-Hangers, Series T.
 - 2) GEMCO; Perforated Base.
 - 3) Midwest Fasteners, Inc.; Spindle.
 - b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - c. Spindle: Copper or zinc-coated, low carbon steel fully annealed, 0.106 inch diameter shank, length to suit depth of insulation indicated.
 - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
- 4. Self-Sticking Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - 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) AGM Industries, Inc.; Tactoo Insul-Hangers, Series TSA.
 - 2) GEMCO; Press and Peel.
 - 3) Midwest Fasteners, Inc.; Self Stick.
 - b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.

- c. Spindle: Copper or zinc-coated, low carbon steel fully annealed, 0.106 inch diameter shank, length to suit depth of insulation indicated.
- d. Adhesive-backed base with a peel-off protective cover.
- 5. Insulation Retaining Washers: Self-locking washers formed from 0.016 inch thick, galvanized steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - 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) AGM Industries, Inc.; RC-150.
 - 2) GEMCO; R-150.
 - 3) Midwest Fasteners, Inc.; WA-150.
 - 4) Nelson Stud Welding; Speed Clips.
 - b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
- C. Staples: Outward-clinching insulation staples, nominal 3/4 inch wide, stainless steel or Monel.
- D. Wire: 0.080 inch nickel-copper alloy
 - 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. C & F Wire.
 - b. Childers Products.
 - c. PABCO Metals Corporation.

2.11 CORNER ANGLES

A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color coded to match adjacent surface.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
 - 1. Verify that systems and equipment to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.

- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 - Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3 inch wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self sealing lap. Staple laps with outward clinching staples along edge at [2 inches] [4 inches] o.c.
 - a. For below ambient services, apply vapor barrier mastic over staples.
 - 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

- P. For above ambient services, do not install insulation to the following:
 - 1. Vibration control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4. Manholes.
 - Handholes.
 - Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 - 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 - 4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. Insulation Installation at Fire Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire rated walls and partitions. Terminate insulation at fire damper sleeves for fire rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
 - 1. Comply with requirements in Division 07 Section "Penetration Firestopping" irestopping and fire-resistive joint sealers.
- E. Insulation Installation at Floor Penetrations:
 - Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
 - 2. Pipe: Install insulation continuously through floor penetrations.
 - 3. Seal penetrations through fire rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.5 EQUIPMENT, TANK, AND VESSEL INSULATION INSTALLATION

A. Insulation Installation on Pumps:

- 1. Fabricate metal boxes lined with insulation. Fit boxes around pumps and coincide box joints with splits in pump casings. Fabricate joints with outward bolted flanges. Bolt flanges on 6 inch centers, starting at corners. Install 3/8 inch diameter fasteners with wing nuts. Alternatively, secure the box sections together using a latching mechanism.
- 2. Fabricate boxes from galvanized steel, at least 0.040 inch thick.
- For below ambient services, install a vapor barrier at seams, joints, and penetrations. Seal between flanges with replaceable gasket material to form a vapor barrier.

3.6 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor retarder integrity, unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 - 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 - 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
 - 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 - 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 - 8. For services not specified to receive a field-applied jacket except for flexible elastomeric, install fitted PVC cover over elbows, tees, strainers, valves, flanges,

- and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
- 9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
 - 1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 - 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless steel or aluminum bands. Select band material compatible with insulation and jacket.
 - 3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
 - 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 - 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.7 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Fittings and Elbows:
 - 1. Install mitered sections of pipe insulation.
 - 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Valves and Pipe Specialties:
 - 1. Install preformed valve covers manufactured of same material as pipe insulation when available.
 - 2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - 3. Install insulation to flanges as specified for flange insulation application.
 - Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 MINERAL FIBER INSULATION INSTALLATION

- A. Insulation Installation on Straight Pipes and Tubes:
 - 1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor barrier mastic and joint sealant.
 - 3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
 - 4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor barrier mastic and flashing sealant.
- B. Insulation Installation on Pipe Flanges:
 - 1. Install preformed pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral fiber blanket insulation.
 - 4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
- C. Insulation Installation on Pipe Fittings and Elbows:
 - 1. Install preformed sections of same material as straight segments of pipe insulation when available.
 - 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
- D. Insulation Installation on Valves and Pipe Specialties:
 - 1. Install preformed sections of same material as straight segments of pipe insulation when available.
 - 2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
 - 3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - 4. Install insulation to flanges as specified for flange insulation application.
- E. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
 - 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 - 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 - 3. Install either capacitor discharge weld pins and speed washers or cupped-head, capacitor discharge weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.

- c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
- d. Do not overcompress insulation during installation.
- e. Impale insulation over pins and attach speed washers.
- f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
- 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2 inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory or field-applied jacket, adhesive, vapor barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor barrier seal.
- 5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
- 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
- 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6 inch wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.
- F. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
 - 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 - 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 - 3. Install either capacitor discharge weld pins and speed washers or cupped-head, capacitor discharge weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 - 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2 inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or

field-applied jacket, adhesive, vapor barrier mastic, and sealant at joints, seams, and protrusions.

- a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor barrier seal.
- 5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
- 6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6 inch wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.9 FIELD-APPLIED JACKET INSTALLATION

- A. Where PVC jackets are indicated, install with 1 inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
 - 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
- B. Where metal jackets are indicated, install with 2 inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless steel bands 12 inches o.c. and at end joints.
- C. Refer to details on drawings for exterior ductwork jacketing.

3.10 FINISHES

- A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- B. Do not field paint aluminum jackets.

3.11 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
 - 1. Indoor, concealed supply and outdoor air.
 - 2. Indoor, exposed supply and outdoor air.
 - 3. Indoor, concealed return located in nonconditioned space.
 - 4. Indoor, exposed return located in nonconditioned space.
 - 5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
 - 6. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
 - 7. Outdoor, exposed supply and return ductwork.
- B. Items Not Insulated:
 - 1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
 - 2. Factory-insulated flexible ducts.
 - 3. Factory-insulated plenums and casings.
 - 4. Flexible connectors.
 - 5. Vibration control devices.
 - 6. Factory-insulated access panels and doors.

3.12 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, supply-air duct insulation shall be the following:
 - 1. Mineral Fiber Blanket: 1-1/2 inches thick, R-6 minimum R-value.
- B. Concealed, return-air duct insulation shall be the following:
 - 1. Mineral Fiber Blanket: 1-1/2 inches thick, R-6 minimum R-value.
- C. Concealed, outdoor-air duct insulation shall be the following:
 - 1. Mineral Fiber Blanket: 1-1/2 inches thick, R-6 minimum R-value.
- D. Concealed, relief-air duct insulation shall be the following:
 - 1. Mineral Fiber Blanket: 1-1/2 inches thick, R-6 minimum R-value.
- E. Exposed, supply-air duct insulation shall be the following:
 - 1. Mineral Fiber Board: 1-1/2 inches thick, R-6 minimum R-value.
- F. Exposed, return-air duct insulation shall be the following:
 - 1. Mineral Fiber Board: 1-1/2 inches thick, R-6 minimum R-value.
- G. Exposed, outdoor-air duct insulation shall be the following:
 - 1. Mineral Fiber Board: 1-1/2 inches thick, R-6 minimum R-value.
- H. Exposed, relief-air duct insulation shall be the following:
 - 1. Mineral Fiber Board: 1-1/2 inches thick, R-6 minimum R-value.

3.13 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Insulation materials and thicknesses are identified below. If more than one material is listed for a duct system, selection from materials listed is Contractor's option.
- B. Exposed, rectangular, duct insulation shall be the following:
 - 1. Polyisocyanurate: 2-1/2 inches thick, R-12 minimum R-value.

3.14 EQUIPMENT INSULATION SCHEDULE

- A. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.
- B. Chilled water pump insulation shall be the following:
 - 1. Polyisocyanurate: 1-1/2 inches thick.

3.15 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.16 INDOOR PIPING INSULATION SCHEDULE

- A. Condensate and Equipment Drain Water below 60 Deg F:
 - 1. All Pipe Sizes: Insulation shall be the following:
 - a. Mineral Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- B. Chilled Water and Brine, above 40 Deg F:
 - NPS 12 and Smaller: Insulation shall be the following:
 - a. Mineral Fiber, Preformed Pipe, Type I 1-1/2 inches thick.
- C. Heating Hot Water Supply and Return, 200 Deg F and below:
 - 1. All Pipe Sizes: Insulation shall be the following:
 - a. Mineral Fiber, Preformed Pipe, Type I: 2 inches thick.
- D. Refrigerant Piping:

- 1. All Pipe Sizes: Insulation shall be the following:
 - a. Flexible Elastomeric: 1-1/2 inch thick.

3.17 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

- A. Refrigerant Piping:
 - 1. All Pipe Sizes: Insulation shall be the following:
 - a. Flexible Elastomeric: 1-1/2 inches thick.

3.18 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Piping, Exposed:
 - 1. PVC: 40 mils thick.
 - 2. Aluminum, with Z-Shaped Locking Seam: 0.016 inch thick.

END OF SECTION 230700

SECTION 230800 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.
- B. Related Sections:
 - 1. Division 26 Section "Commissioning of Electrical Systems".

1.3 DEFINITIONS

- A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- B. CxA: Commissioning Authority.
- C. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.
- D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.4 CONTRACTOR'S RESPONSIBILITIES

- A. Provide all labor, instrumentation, tools, and equipment costs for technicians for the performance of commissioning testing.
- B. Perform commissioning tests at the direction of the CxA.
- C. Attend construction phase controls coordination meeting.
- D. Attend testing, adjusting, and balancing review and coordination meeting.
- E. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
- F. Provide information requested by the CxA for final commissioning documentation.
- G. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.5 CxA'S RESPONSIBILITIES

- A. Provide Project-specific construction checklists and commissioning process test procedures for actual HVAC&R systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.
- B. Direct commissioning testing.
- C. Verify testing, adjusting, and balancing of Work are complete.
- D. Provide test data, inspection reports, and certificates in Systems Manual.
- E. The CxA will be appointed by and work directly for the School District.

1.6 COMMISSIONING DOCUMENTATION

A. Provide the following information to the CxA for inclusion in the commissioning plan:

- 1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
- 2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
- 3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC&R systems, assemblies, equipment, and components to be verified and tested.
- 4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
- 5. Certificate of readiness certifying that HVAC&R systems, subsystems, equipment, and associated controls are ready for testing.
- 6. Test and inspection reports and certificates.
- 7. Corrective action documents.
- 8. Verification of testing, adjusting, and balancing reports.

1.7 SUBMITTALS

- A. Certificates of readiness.
- B. Certificates of completion of installation, prestart, and startup activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TESTING PREPARATION

- A. Certify that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.
- B. Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.
- C. Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.
- D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- E. Inspect and verify the position of each device and interlock identified on checklists.
- F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
- G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.2 TESTING AND BALANCING VERIFICATION

- A. Prior to performance of testing and balancing Work, provide copies of reports, sample forms, checklists, and certificates to the CxA.
- B. Notify the CxA at least 10 days in advance of testing and balancing Work, and provide access for the CxA to witness testing and balancing Work.
- C. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC&R systems at the direction of the CxA.
 - 1. The CxA will notify testing and balancing Subcontractor 10 days in advance of the date of field verification. Notice will not include data points to be verified.

- 2. The testing and balancing Subcontractor shall use the same instruments (by model and serial number) that were used when original data were collected.
- 3. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3 dB shall result in rejection of final testing. Variations in background noise must be considered.
- 4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.3 GENERAL TESTING REQUIREMENTS

- A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.
- B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.
- C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.
- D. The CxA shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.
- E. Tests will be performed using design conditions whenever possible.
- F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
- G. The CxA may direct that set points be altered when simulating conditions is not practical.
- H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.
- I. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.
- J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.4 HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTED

- A. At a minimum the following items listed below are to be tested as part of the commissioning process, refer to the specifications for additional requirements:
 - 1. Fan coil units and associated components.
 - 2. Ductless split air conditioning system and associated components.
 - 3. Hot water pumps and variable frequency drives.
 - 4. Exhaust fan systems and associated components.
 - 5. HVAC automatic temperature controls systems and sequences of operations.

END OF SECTION 230800

SECTION 230900 - BUILDING AUTOMATION SYSTEM

PART 1 - GENERAL

1.0 CONTROL SYSTEM DESCRIPTION

- A. The intent of this project is to have a Trane Tracer Building Automation System
- B. The new Tracer Building system will provide controls to all new equipment shown on drawings. The Trane system will operate independently of the schools separate BMS.
- C. All Trane Controls Products to be bought directly from Orange Ulster BOCES for installation.
- D. All controls products, control equipment, software, hardware, programming, graphics, wiring and conduit specified in this section shall be provided by Trane.
- E. Provide labor, controls materials, controls equipment and services as required for a complete BACnet Building Automation System (BAS), to perform the functions described in this Section. Controls System shall be Web-based and accessible either directly connected and/or through the owners IP LAN network.
- F. It is the BAS manufacturer's responsibility to provide all the design, engineering, and field coordination required to ensure all equipment sequence of operations are met as specified and the designated BAS operators have the capability of managing the building mechanical system.
- G. The BAS shall meet BACnet communication standards to ensure the system maintains "interoperability" to avoid proprietary arrangements that will make it difficult for the Owner to consider other BAS manufacturers in future projects.
- H. BAS controllers shall be listed by BACnet Testing Laboratories (BTL) with appropriate classification.
- I. Direct Digital Control (DDC) technology shall be used to provide the functions necessary for control of mechanical systems and equipment on this project.
- J. The BAS manufacturer shall provide all hardware and software necessary to implement the functions and sequence of operations specified.

1.1 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION (will be provided to and installed by mechanical contractor)

- 1. Control Valves
- 2. Variable frequency drives (to be provided and installed by mechanical contractor)
- 3. Flow Switches
- 4. Temperature Sensor Wells and Sockets
- 5. Hydronic Pressure Taps
- 6. Hydronic Flow meters
- 7. Automatic Dampers

1.2 APPROVED CONTROL SYSTEM MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirments, provide products by the following:
 - 1. Trane (Lauren Hayes 518-410-9375 Lauren.hayes@tranetechnologies.com)

1.3 CODES AND STANDARDS

- A. 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.
 - 3. Federal Communications Commission -- Part J.
 - ASHRAE/ANSI 135-2012 (BACnet) (System Level Devices) Building Controllers shall conform to the listed version of the BACnet specification in order to improve interoperability with various building system manufacturers' control systems and devices.
 - ASHRAE/ANSI 135-2012 (BACnet) (Unit Level Devices) Unit Controllers shall conform to the listed version of the BACnet specification in order to improve interoperability with various building system manufacturers' control systems and devices.

1.4 SYSTEM PERFORMANCE

- A. Performance Standards. The BAS system shall conform to the following:
 - 1. Graphic Display. The system shall display a graphic with a minimum of 20 dynamic points. All current data shall be displayed within 10 seconds of the operator's request.
 - 2. Graphic Refresh. The system shall update all dynamic points with current data within 10 seconds.
 - 3. Object Command. The maximum time between the command of a binary object by the operator and the reaction by the device shall be 5 seconds. Analog objects shall start to adjust within 5 seconds.
 - 4. Object Scan. All changes of state and change of analog values shall be transmitted over the high-speed network such that any data used or displayed at a controller or workstation will be current within the prior 10 seconds.
 - 5. Alarm Response Time. The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed 10 seconds.
 - 6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 seconds. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control.
 - 7. Programmable Controllers shall be able to execute DDC PID control loops at a selectable frequency from at least once every 5 seconds. The controller shall scan and update the process value and output generated by this calculation at this same frequency.
 - 8. Reporting Accuracy. Table 1 lists minimum acceptable reporting accuracies for all values reported by the specified system.
 - a. Table 1: Reporting Accuracy

	D 1 1 A
Magazirad Variable	Reported Accuracy
Measured Variable	10.500 [1405]
Conses Towns are towns	±0.5°C [±1°F]
Space Temperature	.4.000 [::005]
D	±1.0°C [±2°F]
Ducted Air	1.4.000 [1.005]
	±1.0°C [±2°F]
Outside Air	0.500.5.4053
\	±0.5°C [±1°F]
Water Temperature	
	±0.15°C[±0.25°F]
Delta –T	
	±5% RH
Relative Humidity	
	±5% of full scale
Water Flow	
	±10% of reading *Note 1
Air Flow (terminal)	
	±5% of reading
Air Flow (measuring stations)	
	±25 Pa [±0.1 "W.G.]
Air Pressure (ducts)	
	±3 Pa [±0.01 "W.G.]
Air Pressure (space)	
	±2% of full scale *Note 2
Water Pressure	
	5% of reading *Note 3
Electrical Power	
	± 50 PPM
Carbon Monoxide (CO)	
	± 50 PPM
Carbon Dioxide (CO2)	
• • •	

Note 1: (10%-100% of scale) (cannot read accurately below 10%)

Note 2: for both absolute and differential pressure

Note 3: * not including utility supplied meters

1.5 SUBMITTAL REQUIREMENTS

- A. BAS manufacturer shall provide shop drawings and manufacturers' standard specification data sheets on all hardware and software being provided for this project. No work may begin on any segment of this project until the Engineer and Owner have reviewed submittals for conformity with the plan and specifications. Six (6) copies are required. All shop drawings shall be provided to the Owner electronically once they have been approved and as-built drawings have been completed.
- B. Quantities of items submitted shall be reviewed by the Engineer and Owner. Such review shall not relieve the BAS manufacturer of furnishing quantities required based upon contract documents.

- C. Provide the Engineer and Owner, any additional information or data which is deemed necessary to determine compliance with the specifications or which is deemed valuable in documenting and understanding the system to be installed.
- D. Submit the following within 90 days of contract award:
 - 1. A complete bill of materials of equipment to be used indicating quantities, manufacturers and model numbers.
 - 2. A schedule of all control valves including the valve size, pressure drop, model number (including pattern and connections), flow, CV, body pressure rating, and location.
 - 3. A schedule of all control dampers including damper size, pressure drop, manufacturer, and model number.
 - 4. Provide all manufacturers' technical cut sheets for major system components.
 - 5. Provide proposed Building Automation System architectural diagram depicting various controller types, workstations, device locations, addresses, and communication cable requirements
 - 6. Provide detailed termination drawings showing all required field and factory terminations, as well as terminal tie-ins to DDC controls provided by mechanical equipment manufacturers. Terminal numbers shall be clearly labeled.
 - 7. Provide points list showing all system objects and the proposed English language object names.
 - 8. Provide a sequence of operation for each controlled mechanical system and terminal enddevices.
 - 9. Provide a BACnet Protocol Implementation Conformance Statement (PICS) for each BACnet system level device (i.e. Building Controller & Operator Workstations) type. This defines the points list for proper coordination of interoperability with other building systems if applicable for this project.

1.6 WARRANTY REQUIREMENTS

- A. Warrant all work as follows:
 - BAS system labor and materials shall be warranted free from defects for a period of twelve (12) months after final completion acceptance by the Owner. BAS failures during the warranty period shall be adjusted, repaired, or replaced at no charge to the Owner. The BAS manufacturer shall respond to the Owner's request for warranty service within 24 hours of the initiated call and will occur during normal business hours (8AM-5PM).
 - At the end of the final start-up/testing, if equipment and systems are operating satisfactorily to the Owner and Engineer, the Owner shall sign certificates certifying that the BAS is operational, and has been tested and accepted in accordance with the terms of this specification. The date of Owner's acceptance shall be the start of the warranty period.

1.7 SYSTEM MAINTENANCE

- A. Perform Building Automation System preventative maintenance and support for a period of 1 year (beginning the date of substantial completion).
 - 1. Make a minimum of 2 complete Building Automation System inspections, in addition to normal warranty requirements. Inspections to include:

- a. System Review Review the BAS to correct programming errors, failed points, points in alarm, and points that have been overridden manually.
- b. Seasonal Control Loop Tuning Control loops are reviewed to reflect changing seasonal conditions and / or facility heating and cooling loads.
- c. Sequence of operation verification Systems all verified to be operating as designed and in automatic operation. Scheduling and setpoints are reviewed and modified.
- d. Database back-up
- e. Operator coaching
- 2. Technician shall review critical alarm log and advise owner of additional services that may be required.
- 3. Technician shall provide a written report to owner after each inspection.

1.8 OWNERSHIP OF BAS MATERIAL

- A. Project specific software and documantation shall become the owner's property upon project completion. This includes the following:
 - 1. Operator Graphic files
 - 2. As-built hardware design drawings
 - 3. Operating & Maintenance Manuals
 - 4. BAS System software database
 - 5. Controller application programming databases
 - 6. Application Specific Controller configuration files
 - 7. Required Licensed software

PART 2 PRODUCTS

2.1 MATERIALS

A. Use new products that the manufacturer is currently manufacturing and that have been installed in a minimum of 25 installations. Do not use this installation as a product test site unless explicitly approved in writing by the owner or the owner's representative. Spare parts shall be available for at least five years after completion of this contract.

2.2 COMMUNICATION

- A. This project shall be comprised of a high speed Ethernet network utilizing BACnet/IP communications between System Controllers and Workstations. Each System Controller shall function as a BACnet Router to each unit controller providing a unique BACnet Device ID for all controllers within the system.
- B. Communications between System Controllers and sub-networks of Custom Application Controllers and/or Application Specific Controllers shall meet the ASHRAE 135 Standard either via BACnet MS/TP or BACnet over Zigbee.
 - 1. Wireless Equipment Level Controller Communication and Auxiliary Control Devices shall conform to:
 - i. Each System Controller shall perform communications to a network of Custom Application and Application Specific Controllers on a certified, open standard wireless solution to enable integration with other suppliers using the same open standard.

- ii. Each communication interface shall be ZigBee certified as a BACnet tunneling device as allowed by the BACnet Standard and defined by the Zigbee Alliance.
- iii. Each System Controller shall function as a BACnet Router to each unit controller providing a unique BACnet Device ID for all controllers within the system.
- iv. The controls wireless network shall be capable of similar performance to a wired, equally quantified network by responding to controls requests within 10% timing comparison to provide a similar user experience for facility managers and occupants.
- v. The controls wireless network shall be secured using Advanced Encryption Standard AES-128 (FIPS Pub 197) and HMAC (FIPS Pub 198). A Trust Center will create a randomly generated 128-bit network security key for each ZigBee network.
- vi. IEEE 802.15.4 radios to minimize risk of interference and maximize battery life, reliability, and range.
- vii. Indoor design range shall be a minimum of 200 feet (60 m); open range shall be 2,500 ft. (762 m) with less than 2% packet error rate to minimize the need for repeaters and optimize network reliability.
- viii. To maintain robust communication, self-healing, redundant mesh networking and two-way communications shall be used to optimize the wireless network reliability.
- ix. Wireless communication shall be capable of many-to-one sensors per controller to support averaging, monitoring, and multiple zone applications.
- x. Space/wall sensors shall be available with batteries with a typical life of 15 or more years to minimize maintenance costs or with power harvesting capabilities to minimize the need for batteries.
- xi. Space/wall sensors shall be available with temperature, relative humidity, occupancy, and CO2 to support common HVAC controls applications.
- xii. Occupancy sensors shall be have adequate range, sensing patterns, and number of sensors required to provide 100% coverage.
- xiii. CO2 sensors shall have a design life of 15 or more years, and include barometric pressure sensing and be self-calibrating to minimize maintenance expenses over the life of the sensor.
- xiv. Certifications shall include FCC CFR47 RADIO FREQUENCY DEVICES Section 15.247 & Subpart E

2.3 OPERATOR INTERFACE

- A. Operator Web Interface shall conform to following:
 - 1. System Security
 - i. Each operator shall be required to login to the system with a user name and password in order to view, edit, add, or delete data.
 - ii. User Profiles shall restrict the user to only the objects, applications, and system functions as assigned by the system administrator.
 - iii. Each operator shall be allowed to change their user password.
 - iv. The System Administrator shall be able to manage the security for all other users.
 - v. The system shall include pre-defined "roles" that allow a system administrator to quickly assign permissions to a user.

- vi. User logon/logoff attempts shall be recorded.
- vii. The system shall track and record all user log-in activity and all changes done at the enterprise level including who made the change, when, what was changed, pervious value and new value.

2. Customizable Navigation Tree

- i. The operator web interface shall include a fully customizable navigation tree that shall allow an operator to do the following:
 - (a) Move and edit any of the nodes of the tree.
 - (b) Move entire groups to any area of the tree
 - (c) Change the name of any node in the tree
 - (d) Create custom nodes for any page in the web interface including: graphics, data log views, schedules, and dashboards
 - (e) Support navigation from multi-building to single building view
 - (f) Ability to create folders and assign and change hierarchy of nodes of the tree

3. Standard Equipment Pages

- The operator web interface shall include standard pages for all major equipment.
- ii. These pages shall allow an operator to obtain information relevant to the operation of the equipment, including:
 - (a) Animated Equipment Graphics for each major piece of equipment and floor plan in the System.
 - (b) Alarms relevant to the equipment or application without requiring a user to navigate to an alarm page and perform a filter.
 - (c) Data Logs for the equipment without requiring a user to navigate to a Data Log page and perform a filter.

4. System Graphics Package

- i. The operator web interface shall be graphically based and shall include at least one 3-D color graphic per piece of equipment, graphics for each hydronic system, and graphics that summarize conditions on each floor of each building included in this contract.
- ii. Graphics Package shall include at a minimum:
 - (a) 3-D Color Site Map (for multiple building campus projects) or 3-D Building Rendering (for single building projects)
 - (b) 3-D Color Custom Floor Plans
 - (i) Floor Plan Graphics to show accurate ductwork of system
 - (ii) Toggle Switch to turn ductwork on/off per each floor plan
 - (iii) Indicate thermal comfort on floor plan graphics using colors to represent zone temperature relative to zone set point
 - (c) 3-D Color Hydronic System Graphics with Animations
 - (i) Example Animation: Pump Flashing when On
 - (d) 3-D Color Major Equipment Graphics with Animations
 - (i) Example Animation: Fan Spinning when On

5. Manual Control and Override

i. Point Control. Provide a method for a user to view, override, and edit if applicable, the status of any object and property in the system. The point status shall be available by menu, on graphics or through custom programs.

- ii. Temporary Overrides. The user shall be able to perform a temporary override wherever an override is allowed, automatically removing the override after a specified period of time.
- 6. Engineering Units
 - i. Allow for selection of the desired engineering units (i.e. Inch pound or SI) in the system.

7. Scheduling

- A user shall be able to perform the following tasks utilizing the operator web interface:
- ii. Create a new schedule, defining the default values, events and membership.
- iii. Create exceptions to a schedule for any given day.
- iv. Apply an exception that spans a single day or multiple days.
- v. View a schedule by day, week and month.
- vi. Exception schedules and holidays shall be shown clearly on the calendar.
- vii. Modify the schedule events, members and exceptions.
- viii. Create schedules and exceptions for multiple buildings
- ix. Apply emergency schedule to multiple buildings
- x. Drag and drop scheduling editing
- xi. Global schedule and exceptions across multiple buildings

8. Data Logs

- i. Data Logs Definition.
 - (a) The operator web interface shall allow a user with the appropriate security permissions to define a Data Log for any data in the system.
- ii. Data Log Viewer.
 - (a) The operator web interface shall allow Data Log data to be viewed and printed.
 - (b) The operator web interface shall allow a user to view Data Log data in a text-based format (time –stamp/value).
 - (c) The operator shall be able to view the data collected by a Data Log in a graphical chart in the operator web interface.
 - (d) Data Log viewing capabilities shall include the ability to show a minimum of five points on a chart.
 - (e) Each data point data line shall be displayed as a unique color.
 - (f) Data points can be hidden on the display view by clicking on the point
 - (g) The operator shall be able to specify the duration of historical data to view by scrolling, zooming, or selecting from a pull down list.
 - (h) The system shall provide a graphical trace display of the associated time stamp and value for any selected point along the x-axis.
- iii. Export Data Logs.
 - (a) The Enterprise operator web interface shall allow a user to export Data Log data in CSV, xlsx or text format for use by other industry standard word processing and spreadsheet packages.

9. Alarm/Event Notification

- i. An operator shall be notified of new alarms/events as they occur while navigating through any part of the system via an alarm icon.
- ii. The operator will have the option of selecting an audible alarm notification for all alarm classes they subscribe to.
- iii. The system operator will have the option of setting specific times and days that that they will receive alarm notifications.

- iv. Alarm/Event Log. The operator shall be able to view all logged system alarms/events from any operator web interface.
 - (a) The operator shall be able to sort and filter alarms from events. Alarms shall be sorted in categories based on severity.
 - (b) The alarm/event log shall include a comment field for each alarm/event that allows a user to add specific comments associated with any alarm.

10. User Change Log

- The operator shall be able to view all logged user changes in the system from any operator web interface.
 - (a) An operator shall be able to group user changes by: date, affected, date & affected, user, date & user, transaction type, date & transaction type, or sort only.
 - (b) The operator will have the option of additional filtering capability of: date, transaction, type, user, affected, and details that can be used individually or in conjunction with other filters.

11. Reports

- i. The operator web interface shall provide a reporting package that allows the operator to select reports to run.
- ii. The operator web interface shall provide the ability to schedule reports to run at specified intervals of time.
- iii. The Enterprise operator web interface shall provide the ability to email schedule reports at specified intervals of time.
- iv. The following standard reports shall be available without requiring a user to manually design the report:
 - (a) All Points in Alarm Report: Provide an on demand report showing all current alarms.
 - (b) All Points in Override Report: Provide an on demand report showing all overrides in effect.
 - (c) Schedules Report: List of all weekly events for all schedules in selected buildings
 - (d) Space Comfort Analysis Report: List of spaces that meet selected criteria for potential comfort issues (temp variance, high, low, unoccupied)
- 12. Operator Web Interface must meet the following Agency Compliance:
 - i. BACnet Testing Laboratory (BTL) Listed

2.4 BUILDING CONTROLLERS

- A. There shall be one or more independent, standalone microprocessor based System Controllers to manage the global strategies described in Application and Control Software section.
- B. The System Controller shall have sufficient memory to support its operating system, database, and programming requirements.
- C. The operating system of the Controller shall manage the input and output communications signals to allow distributed controllers to share real and virtual point information and allow central monitoring and alarms.
- D. All System Controllers shall have a real time clock.
- E. Data shall be shared between networked System Controllers.

- F. The System Controller shall continually check the status of its processor and memory circuits. If an abnormal operation is detected, the controller shall:
 - 1. Assume a predetermined failure mode.
 - 2. Generate an alarm notification.
 - 3. Create a retrievable file of the state of all applicable memory locations at the time of the failure.
 - 4. Automatically reset the System Controller to return to a normal operating mode.
- G. Environment. Controller hardware shall be suitable for the anticipated ambient conditions. Controller used in conditioned ambient shall be mounted in an enclosure, and shall be rated for operation at -40° C to 50° C [-40° F to 122° F].
- H. Clock Synchronization.
 - 1. All System Controllers shall be able to synchronize with a NTP server for automatic time synchronization.
 - 2. All System Controllers shall be able to accept a BACnet time synchronization command for automatic time synchronization.
 - 3. All System Controllers shall automatically adjust for daylight savings time if applicable.
- I. Serviceability
 - 1. Provide diagnostic LEDs for power, communications, and processor
- J. Memory. The System Controller shall maintain all BIOS and programming information indefinitely without power to the System controller.
- K. BACnet Test Labs (BTL) Listing. Each System Controller shall be listed as a Building Controller (B-BC) by the BACnet Test Labs with a minimum BACnet Protocol Revision of 14.

2.5 ADVANCED APPLICATION CONTROLLERS

- A. Advance Application Controllers shall be used to control all equipment or applications of medium and high complexity, including but not limited to Air Handlers, Boiler Plants and Chiller Plants
- B. To meet the sequence of operation for each application, the Controller shall use programs provided by the controller manufacturer that are either factory loaded or downloaded with service tool to the Controller.
- C. Stand-Alone Operation: In case of communications failure stand-alone operation shall use default values or last values for remote sensors read over the network such as outdoor air temperature.
- D. Environment. Controller hardware shall be suitable for the anticipated ambient conditions.
- E. Input/Output: The Controller shall have on board or through expansion module all I/O capable of performing all functionality needed for the application. Controls provided by the equipment manufacture must supply the required I/O for the equipment.
- F. Input/Output Expandability For the application flexibility, the Controller shall be capable of expanding to a total of at least 100 hardware I/O terminations.
- G. Serviceability The Controller shall provide the following in order to improve serviceability of the Controller.

- 1. Diagnostic LEDs for power/normal operation/status, BACnet communications, sensor bus communications, and binary outputs. All wiring connections shall be clearly labeled and made to be field removable.
- 2. To aid in service replacement, the Controller shall allow for setting its BACnet address via controller mounted rotary switches that correspond to the numerical value of the address. (DIP switch methodologies are not allowed). Setting of the address shall be accomplished without the need of a service tool or power applied to the controller.
- 3. Controller data shall be maintained through a power failure.
- H. Transformer for the Controller must be rated at minimum of 115% of ASC power consumption, and shall be fused or current limiting type. 24 VAC, +/- 15% nominal, 50-60 Hz, 24 VA plus binary output loads for a maximum of 12 VA for each binary output.
- I. Controller must meet the following Agency Compliance:
 - 1. UL916 PAZX, Open Energy Management Equipment
 - 2. UL94-5V, Flammability
 - 3. FCC Part 15, Subpart B, Class B Limit
 - 4. BACnet Testing Laboratory (BTL) Listed

2.6 APPLICATION-SPECIFIC CONTROLLERS

- A. Application Specific Controllers (ASC) shall be microprocessor-based DDC controller, The ontroller shall use programs provided by the controller manufacturer that are either factory loaded or downloaded with service tool to the Controller.
- B. Zone Controllers are controllers that operate equipment that control the space temperature of single zone. Examples are controllers for VAV, Fan coil, Blower Coils, Unit Ventilators, Heat Pumps, and Water Source Heat Pumps.
- C. Stand-Alone Operation: In case of communications failure stand-alone operation shall use default values or last values for remote sensors read over the network such as outdoor air temperature.
- D. Environment: Controller hardware shall be suitable for the anticipated ambient conditions.
- E. Input/Output: The Controller shall have on board or through expansion module all I/O capable of performing all functionality needed for the application. Controls provided by the equipment manufacture must supply the required I/O for the equipment.
- F. Input/Output Expandability For the application flexibility, the Controller shall be capable of expanding to a total of at least 100 hardware I/O terminations.
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 - 1. Diagnostic LEDs for power/normal operation/status, BACnet communications, sensor bus communications, and binary outputs. All wiring connections shall be clearly labeled and made to be field removable.
 - To aid in service replacement, the Controller shall allow for setting its BACnet
 address via controller mounted rotary switches that correspond to the numerical
 value of the address. (DIP switch methodologies are not allowed). Setting of the
 address shall be accomplished without the need of a service tool or power applied
 to the controller.
 - 3. Controller data shall be maintained through a power failure.
- H. Transformer for the Controller must be rated at minimum of 115% of ASC power consumption, and shall be fused or current limiting type. 24 VAC, +/- 15% nominal, 50-60 Hz, 24 VA plus binary output loads for a maximum of 12 VA for each binary output.

- I. Controller must meet the following Agency Compliance:
 - 1. UL916 PAZX, Open Energy Management Equipment
 - 2. UL94-5V, Flammability
 - 3. FCC Part 15, Subpart B, Class B Limit
 - 4. BACnet Testing Laboratory (BTL) Listed

2.7 FIELD HARDWARE/INSTRUMENTATION

- A. Temperature Sensing Devices
 - 1. Type & Accuracy. Temperature sensors shall be of the type and accuracy indicated for the application. Sensors shall have an accuracy rating within 1% of the intended use temperature range.
 - 2. Outside Air Temperature Sensors. Outside air temperature sensors' accuracy shall be within +1degF in the range of -52degF to 152degF.
 - 3. Room Temperature Sensors. Room temperature sensors shall have an accuracy of +0.36degF in the range of 32degF to 96degF.
 - 4. Chilled Water and Condenser Water Sensors. Chilled water and condenser water sensors shall have an accuracy of +0.25degF in their range of application.
 - 5. Hot Water Temperature Sensors. Hot water temperature sensors shall have an accuracy of +0.75degF over the range of their application.
- B. Pressure Instruments
 - 1. Differential Pressure and Pressure Sensors: Sensors shall have a 4-20 MA output proportional signal with provisions for field checking. Sensors shall withstand up to 150% of rated pressure, without damaging the device. Accuracy shall be within +2% of full scale. Sensors shall be manufactured by Leeds & Northrup, Setra, Robertshaw, Dwyer Instruments, Rosemont, or be approved equal.
 - 2. Pressure Switches: Pressure switches shall have a repetitive accuracy of +2% of range and withstand up to 150% of rated pressure. Sensors shall be diaphragm or bourdon tube design. Switch operation shall be adjustable over the operating pressure range. The switch shall have an application rated Form C, snap-acting, self-wiping contact of platinum alloy, silver alloy, or gold plating.
- C. Flow Switches:
 - 1. Flow switches shall have a repetitive accuracy of +1% of their operating range. Switch actuation shall be adjustable over the operating flow range. Switches shall have snap-acting Form C contacts rated for the specific electrical application.
- D. Humidity Sensors:
 - 1. Sensors shall have an accuracy of +2.5% over a range of 20% to 95% RH.
- E. Current Sensing Relays
 - 1. Relays shall monitor status of motor loads. Switch shall have self-wiping, snapacting Form C contacts rated for the application. The setpoint of the contact operation shall be field adjustable.
- F. Output Relays
 - Control relay contacts shall be rated for 150% of the loading application, with self-wiping, snap-acting Form C contacts, enclosed in dustproof enclosure. Relays shall have silver cadmium contacts with a minimum life span rating of one million operations. Relays shall be equipped with coil transient suppression devices.
- G. Solid State Relays

- 1. Input/output isolation shall be greater than 10 billion ohms with a breakdown voltage of 15 V root mean square, or greater, at 60 Hz. The contact operating life shall be 10 million operations or greater. The ambient temperature range of SSRs shall be 20□F-140□F. Input impedance shall be greater than 500 ohms. Relays shall be rated for the application. Operating and release time shall be 10 milliseconds or less. Transient suppression shall be provided as an integral part of the relays.
- H. Valve and Damper Actuators
 - 1. Electronic Direct-Coupled: Electronic direct-coupled actuation shall be provided.
 - 2. Actuator Mounting: The actuator shall be direct-coupled over the shaft, enabling it to be mounted directly to the damper shaft without the need for connecting linkage. The fastening clamp assemble shall be of a 'V' bolt design with associated 'V' shaped toothed cradle attaching to the shaft for maximum strength and eliminating slippage. Spring return actuators shall have a 'V' clamp assembly of sufficient size to be directly mounted to an integral jackshaft of up to 1.05 inches when the damper is constructed in this manner. Single bolt or screw type fasteners are not acceptable
 - 3. Electronic Overload Sensing: The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the entire rotation of the actuator. Mechanical end switches or magnetic clutch to deactivate the actuator at the end of rotation are not acceptable.
 - 4. Power Failure/Safety Applications: For power failure/safety applications, an internal mechanical spring return mechanism shall be built into the actuator housing. Non-mechanical forms of fail-safe operation are not acceptable.
 - 5. Spring Return Actuators: All spring return actuators shall be capable of both clockwise or counterclockwise spring return operation by simply changing the mounting orientation.
 - 6. Proportional Actuators: Proportional actuators shall accept a 0 to 10VDC or 0 to 20mA control input and provide a 2 to 10VDC or 4 to 20mA operating range. An actuator capable of accepting a pulse width modulating control signal and providing full proportional operation of the damper is acceptable. All actuators shall provide a 2 to 10VDC position feedback signal.
 - 7. 24 Volts (AC/DC) actuators: All 24VAC/DC actuators shall operate on Class 2 wiring and shall not require more than 10VA for AC or more than 8 watts for DC applications. Actuators operating on 120VAC power shall not require more than 10VA. Actuators operating on 230VAC shall not require more than 11VA.
 - 8. Non-Spring Return Actuators: All non-spring return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring return actuators with more than 60 in-lb torque shall have a manual crank for this purpose.
 - 9. Modulating Actuators: All modulating actuators shall have an external, built-in switch to allow reversing direction of rotation.
 - 10. Conduit Fitting & Pre-Wiring: Actuators shall be provided with a conduit fitting and a minimum 3ft electrical cable, and shall be pre-wired to eliminate the necessity of opening the actuator housing to make electrical connections.

- 11. U.L. Listing: Actuators shall be Underwriters Laboratories Standard 873 listed and Canadian Standards Association Class 4813 02 certified as meeting correct safety requirements and recognized industry standards.
- 12. Warranty: Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque and shall have a 2-year manufacturer's warranty, starting from the date of installation. Manufacturer shall be ISO9001 certified.
- I. Control Valves: Provide factory fabricated U.S. forged and assembled electric control valves of type, body material, and pressure class indicated. Where type or body material is not indicated, provide selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature in piping system. Provide valve size in accordance with scheduled or specified maximum pressure drop across control valve. Except as otherwise indicated, provide valves which mate and match material of connecting piping. Equip control valves with control valve motor actuators, with proper shutoff rating for each individual application.
 - Water Service Valves: Equal percentage characteristics with rangeability of 50 to 1, Class 150 at 250°F and maximum full flow pressure drop 5 psig. Globe type with replaceable plugs and seats of stainless steel or brass. Select operators to close valves against pump shutoff head.
 - 2. Double Seated Valves: Balanced plug type, with caged type trim providing seating and guiding surfaces on "top and bottom" guided plugs.
 - 3. Valve Trim and Stems: Polished stainless steel.
 - 4. Packing: Spring-loaded teflon, self-adjusting.
 - 5. Terminal Unit Control Valves: Provide control ball valves for control of terminal units including, but not necessarily limited to, convectors, thinned tube radiation, and fan coil units that are of integral motor type. Provide 2-position or modulating type valves, electrically actuated by line voltage or by 24VAC.
- J. Dampers: Provide automatic control low leakage, opposed blade dampers, with damper frames not less than formed 13-gauged galvanized steel. Provide mounting holes for enclosed duct mounting. Provide damper blades not less than formed 16-gauged galvanized steel, with maximum blade width of 8-inch. Equip dampers with motors of proper rating of each application.
 - 1. Secure blades to ½ inch diameter zinc-plated axles using zinc-plated hardware. Seal off against spring stainless steel blade bearings. Provide blade bearings Nylon and provide thrust bearings at each end of every blade. Construct blade linkage hardware of zinc-plated steel and brass. Submit leakage and flow characteristics plus size schedule for controlled dampers.
 - 2. Operating Temperature Range: From –20° to 200°F (-29° to 93°C).
 - 3. For low leakage application or opposed blade design (as selected by manufacturers sizing techniques) with inflatable steel blade edging or replaceable rubber seals, rated for leakage less than 10 cfm per square foot of damper area, AR differential pressure of 4-inch w.g. when damper is being held by torque 50 inch-pounds

PART 3 EXECUTION

3.1 COORDINATION

- A. Provide power from existing electrical distribution system as necessary for the controls system. Must comply with the National Electrical Code.
- B. Test and Balance
 - 1. The contractor shall furnish a single set of all tools necessary to interface to the control system for test and balance purposes.
 - 2. The tools used during the test and balance process shall be returned to the contractor at the completion of the testing and balancing.

3.2 INSTALLATION

- A. Connect and configure equipment and software to achieve sequences of operations specified
- B. Verify location of exposed control sensors with arhitect prior to installation. Install devices 60 inches above the floor.
- C. Install damper moters on outside of duct in warm areas, not tin locations exposed to outdoor temperatures.

3.3 ELECTRICAL WIRING AND CONNECTION INSTALLATION

- A. Install raceways, boxes, and cabinets according to Section 260533 "Raceways and Boxes for Electrical Systems."
- B. Install building wire and cable according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Install signal and communication cable accroding to Section 271500 "Communications Horizontal Cabling."
- D. Where Class 2 wires are in concealed and accessible locations; including ceiling return air plenums, approved cables outside of electrical raceway can be used provided that the following conditions are met:
 - 1. Circuits meet NEC Class 2 (current-limited) requirements. (Low-voltage power circuits shall be sub-fused when required to meet Class 2 current-limit.)
 - 2. All cables shall be UL listed for application (i.e., cables used in ceiling plenums shall be UL listed specifically for that purpose).
- E. Do not install Class 2 wiring in conduits containing Class 1 wiring. Boxes and panels containing high voltage may not be used for low voltage wiring except for the purpose of interfacing the two via control relays and transformers.
- F. Where Class 2 wiring is run exposed, wiring shall be run parallel along a surface or perpendicular to it, and bundled, using approved wire ties at no greater than 3 m (10 ft.) intervals. Such bundled cable shall be fastened to the structure, using industry approved fasteners, at 1.5 m (5 ft.) intervals or more often to achieve a neat and workmanlike result.
- G. Maximum allowable voltage for control wiring shall be 120Vac. If only higher voltages are available for use, the BAS manufacturer shall provide step-down transformers to achieve the desired control voltages.
- H. All control 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.

- I. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment
- J. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations in accordance with Contract Documents and National and/or Local Codes.
- K. Control and status relays are to be located in pre-fabricated enclosures that meet the application. These relays may also be located within packaged equipment control panel enclosures as coordinated. These relays shall not be located within Class 1 starter enclosures.
- L. Follow manufacturer's installation recommendations for all communication and network bus cabling. Network or communication cabling shall be run separately from all control power wiring.
- M. BAS manufacturer shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.
- N. Flexible metal conduits and liquid-tight flexible metal conduits shall not exceed 3' 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, including chiller and boiler rooms, liquid-tight, flexible metal conduits shall be used.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
 - Test and adjust controls and safeties.
 - 3. Test each point through its full operating range to verify that safety and operating control setpoints are as required.
 - 4. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
 - 5. Test each system for compliance with sequence of operation.
 - 6. Test software and hardware interlocks.

C. DDC Verification:

- 1. Verify that instruments are installed before calibration, testing, and loop or leak checks
- 2. Check instruments for proper location and accessibility.
- 3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
- 4. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
- 5. Check control valves. Verify that they are in correct direction.
- Check DDC system as follows:
 - i. a. Verify that wires at control panels are tagged with their service designation and approved tagging system.
 - ii. b. Verify that DDC controllers are protected from power supply surges.

 Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

3.5 CONTROL SYSTEM DEMONSTRATION AND ACCEPTANCE

- A. Demonstration: A complete demonstration of the capabilities of the BAS system shall be performed by the BAS manufacturer's field personnel. The BAS manufacturer shall dedicate a minimum of (16) hours on-site with the Owner representatives, and Engineer to demonstrate a complete functional test of all the BAS system requirements. This BAS demonstration shall constitute an acceptance inspection, and will represent the process of approving the BAS as designed and specified. Functional testing shall include, but is not limited to, the following system level components where installed:
- B. Acceptance: The BAS 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. 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.

3.6 TRAINING

- A. Provide two training sessions of four (8) hours minimum per session, with sessions on separate days for the facility maintenance staff. The training shall review accessing the web based building automation system (BAS) by password, show how to navigate through each of the system's graphic screens to identify each of the parameters which are just monitored and what parameters can be adjusted (setpoints and schedules), review each of the alarms which can be sent to the BAS and how the maintenance staff should address each, and proper logging out of the system.
 - 1. Review with the maintenance staff current setpoints and instruct them how to adjust the setpoints. Instruct the staff in how to adjust equipment schedules and assist them in setting up each applicable schedule.
 - 2. Instruct the staff in system troubleshooting. Instruct them in setup of trending / data logging and how to review the resulting data.
 - 3. Instruct the staff how to do seasonal system startups and shutdowns.
 - 4. Provide a walk-through of the building and review the location of room sensors and unit controllers.

END OF SECTION 230900

SECTION 230993 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes control sequences for HVAC systems, subsystems, and equipment.
- B. Related Sections include the following:
 - 1. Division 23 Section, "HVAC Instrumentation and Control" for control equipment and devices and for submittal requirements.

1.3 DEFINITIONS

- A. DDC: Direct digital control.
- B. VAV: Variable air volume.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate mechanical system controlled and control system components.
 - 1. Label with settings, adjustable range of control and limits. Include written description of control sequence.
 - 2. Include flow diagrams for each control system, graphically depicting control logic.
 - 3. Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of components and set-points of controls, including changes to sequences made after submission of shop drawings.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 GENERAL

- A. All equipment listed below and indicated on drawings along with all associated control elements shall be graphically represented on the Building Management System (BMS).
- B. For equipment listed below and indicated on drawings, manual override capabilities shall be provided through the BMS.
- C. Refer to the points list on the drawings for BMS inputs and outputs.
- D. All set-points indicated below shall be adjustable.

- E. Thermostat Set-points:
 - 1. Occupied Heating Set-point: 70 degrees F
 - 2. Occupied Cooling Set-point: 75 degrees F
 - 3. Unoccupied Heating Set-point: 67 degrees F
 - 4. Unoccupied Cooling Set-point: 80 degrees F
 - 5. Deadband: 5 degrees F
- F. Provide commissioning documentation in accordance with the requirements of Section 230800.

3.2 COMMISSIONING OF HVAC SYSTEMS.

Operations provided under this section of the specification will be tested as part of a larger system.

3.3 HOT WATER PUMPS (HWP)

- A. When hot water from the existing boiler system is available the BMS shall sequence the lead secondary pump on, when the outside air temperature falls below a programmable set-point (as sensed by an outdoor air temperature sensor/transmitter); the lead pump shall run continuously and the stand-by pump shall remain off. When the outside air temperature rises above the programmable set-point the lead pump shall shutdown.
- B. The BMS shall select and alternate the lead and lag pump. The lead pump shall alternate to the lag pump after a programmable time period to accomplish equal hours of run time on each pump. If the lead pump fails an alarm shall be provided by the BMS and the lag pump shall be automatically activated in place of the scheduled lead pump.
- C. Each pump shall be provided with a VFD for speed control arranged to vary pump output in response to load. Provide pressure sensors in the mains arranged to signal the VFD and vary pump speed. VFD shall modulate to maintain system differential pressure set-point. Differential set-point shall be determined in field during project commissioning phase.

3.4 EXHAUST FANS (EF-13 and 15)

- A. Exhaust fans shall be sequenced on by the BMS during programmed "occupied" time periods. The fans shall be shut-down during "unoccupied" time periods. Each fan shall have individual scheduling capability. When the exhaust fan is called to activate the associated motorized damper shall open and then the fan shall turn on. Whenever the exhaust fan is shut-down the associated motorized damper shall be closed.
- B. Provide fan shut-down interlocked with the fire alarm system for exhaust fans greater than 1,000 CFM. Fire alarm system shall shut-down exhaust fan.
- C. Refer to "General Roof Exhaust Fan Controls Schematic" on drawings.

3.5 FOUR PIPE FAN COIL UNITS

- A. Fan coil units are to be controlled by an application specific unitary DDC controller.
- B. Unoccupied Operation: In the unoccupied mode, the supply fan shall be indexed off, the outside air damper shall modulate closed, the return air damper shall position open and the heating 3-way valve shall be modulated either closed (summer) or open (winter) based upon an adjustable outside air temperature. If the space temperature falls below the adjustable unoccupied heating set-point, the fan shall cycle on, the

- outside air damper shall remain closed and heating valve shall open. If the space temperature rises above the adjustable unoccupied cooling set-point and the outside air temperature is less than the space temperature, the fan shall be cycled on, the outside air damper shall be opened and the heating valve shall be closed. Upon a further call for unoccupied cooling the chilled water 3-way valve shall modulate open.
- C. Morning Warm-up: When there is a call for heating and the zone temperature is two degrees off of set-point, a morning warm-up sequence shall be turned on, the outside air damper shall remain closed, the return air damper shall be full open and the heating valve shall open. When the zone reaches the heating set-point, the outside air damper shall go to minimum and the fan coil unit shall operate in the occupied mode.
- D. Morning Cool-down: When a morning cool-down is initiated the unit shall operate in the airside-economizing mode and fan shall be indexed on. If economizer mode is not available the outside air damper shall remain closed, the return air damper shall be full open and the cooling valve shall open. When the zone temperature reaches the cooling set-point, the outside air damper shall go to minimum and the fan coil unit shall operate in the occupied mode.
- E. Occupied Operation:
 - 1. When the fan coil unit is in the heating mode and the system has hot water, a call for heating shall open the outside air damper to minimum position for ventilation and modulate the heating 3-way valve to maintain the space temperature set point. When the fan coil unit is in the cooling mode and the system has chilled water, a call for cooling shall open the outside air damper to minimum position for ventilation and modulate the cooling 3-way valve to maintain the space temperature set point.
 - 2. The fan coil unit fan shall run continuously, while in the occupied mode. During occupied mode, airside economizer operation shall be provided when available for all units. The BMS, based on outside air enthalpy as sensed by a remote sensor/transmitter shall sequence the fan coil unit to economizer mode for "free" cooling with outside air. The economizer shall be activated whenever the outside air temperature drops below an adjustable set point. When the economizer is enabled and the fan coil unit is in the occupied mode, the outside air damper shall modulate between its minimum position and fully open position, and the return air damper (mechanically linked to the outside air damper) shall close/open proportionate to the outside air damper, based on space and discharge air temperature, to maintain the space set point. If the fan coil unit is disabled for economizer operation or is in the heating mode, the outside air damper shall be adjusted to its minimum position and the return damper shall close in proportion. If the
 - space sensor fails or the fan coil unit is in the unoccupied mode or the supply fan is off due to a safety trip-out, the outside air damper shall be fully closed and the return damper shall be full open.
- F. Low Temperature Thermostat (Freezestat): Shall be provided to protect heating coil from freezing. When activated, the fan coil unit fan shall shutdown, outside air damper shall close, heating valve shall position to full open, and alarm shall be provided to the BMS. The set point for freezestat operation shall be adjustable. Reset shall be manual.
- G. Discharge Air Limit Control: Provide an averaging type sensor in the discharge air stream arranged to override the temperature controls and prevent the discharge air temperature from dropping below 65° F (adjustable) and rising above 110°F

- (adjustable) during heating mode. Adjustments shall be made to outside air damper and heating coil valve to keep discharge air between limits.
- H. Space Temperature Set-point: The space temperature heating/cooling set-point shall be programmable and adjustable at the BMS.
- I. General:
 - 1. Provide a condensate overflow switch in the secondary drip pan that will open when the pan is full of condensate. The fan shall be shut-down, cooling shall be deactivated (for the affected unit) and an alarm shall be provided at the BMS.

3.6 DATA CLOSET DUCTLESS SPLIT SYSTEM AIR CONDITIONERS

- A. System shall be operated through factory wireless remote controller, capable of providing set-point adjustments and all programming for control sequences. The system shall cycle On/Off as required to maintain space set-point.
- B. The Factory Installed controls shall be configured such that a Leak detector mounted in the indoor unit drain pan shall be arranged to shut-down the system when water is detected. BMS shall monitor condensate overflow and provide an alarm.
- C. A BMS space temperature sensor shall be provided in each space to monitor space temperature and to provide a high temperature alarm.

END OF SECTION 230993

SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes pipe and fitting materials, joining methods, special-duty valves, and specialties for the following:
 - 1. Hot water heating piping.
 - 2. Chilled water piping.
 - 3. Condensate-drain piping.
 - 4. Air vent piping.

1.3 SUBMITTALS

- A. Product Data: For each type of the following:
 - 1. Plastic pipe and fittings with solvent cement.
 - 2. Valves. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.
 - 3. Air control devices.
 - 4. Chemical treatment.
 - Hydronic specialties.
- B. Shop Drawings: Detail, at 1/4 scale, the piping layout, fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to the building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
- C. Welding certificates.
- D. Qualification Data: For Installer.
- E. Field quality control test reports.
- F. Operation and Maintenance Data: For air control devices, hydronic specialties, and special-duty valves to include in emergency, operation, and maintenance manuals.
- G. Water Analysis: Submit a copy of the water analysis to illustrate water quality available at Project site, initial system water quality, and the final water quality in the piping system after completion of cleaning, flushing and filling.

1.4 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1/D1.1M, "Structural Welding Code Steel."
- B. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the

appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 01.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.
- B. Wrought-Copper Fittings: ASME B16.22.

2.2 STEEL PIPE AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; type, grade, and wall thickness as indicated in Part 3 "Piping Applications" Article.
- B. Cast Iron Threaded Fittings: ASME B16.4; Classes 125 and 250 as indicated in Part 3 "Piping Applications" Article.
- C. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in Part 3 "Piping Applications" Article.
- D. Cast Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; raised ground face, and bolt holes spot faced as indicated in Part 3 "Piping Applications" Article.
- E. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.
- F. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - 1. Material Group: 1.1.
 - 2. End Connections: Butt welding.
 - 3. Facings: Raised face.

2.3 PLASTIC PIPE AND FITTINGS

- A. Solid Wall PVC Pipe: ASTM D 2665, drain, waste and vent.
- B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste and vent patterns.

2.4 JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast iron and steel flanges.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- D. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.
- E. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- F. Solvent Cements for Joining Plastic Piping:
 - 1. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - a. Use adhesive primer and a solvent cement that has a VOC content of 550 g/L and 510 g/L or less respectively when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

G. Gasket Material: Thickness, material, and type suitable for fluid to be handled and working temperatures and pressures.

2.5 TRANSITION FITTINGS

- A. Plastic-to-Metal Transition Fittings:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Charlotte Pipe and Foundry Company.
 - b. IPEX Inc.
 - c. KBi.
 - 2. PVC one-piece fitting with one threaded brass or copper insert and one Schedule 80 solvent-cement-joint end.
- B. Plastic-to-Metal Transition Unions:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Charlotte Pipe and Foundry Company.
 - b. IPEX Inc.
 - c. KBi.
 - d. NIBCO INC.
 - 2. MSS SP-107, PVC union. Include brass or copper end, Schedule 80 solvent-cement-joint end, rubber gasket, and threaded union.

2.6 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper-alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Capitol Manufacturing Company.
 - b. Central Plastics Company.
 - c. Hart Industries International, Inc.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - e. Zurn Plumbing Products Group; AquaSpec Commercial Products Division.
 - 2. Factory-fabricated union assembly, for 250 psig minimum working pressure at 180 deg F.
- D. Dielectric Flanges:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Capitol Manufacturing Company.
 - b. Central Plastics Company.
 - c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Factory-fabricated companion-flange assembly, for 150- or 300 psig minimum working pressure as required to suit system pressures.
- E. Dielectric-Flange Kits:

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to. the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Central Plastics Company.
 - d. Pipeline Seal and Insulator, Inc.
- 2. Companion flange assembly for field assembly. Include flanges, full-face- or ringtype neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
- 3. Separate companion flanges and steel bolts and nuts shall have 150- or 300 psig minimum working pressure where required to suit system pressures.

F. Dielectric Couplings:

- Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Calpico, Inc.
 - b. Lochinvar Corporation.
- 2. Galvanized steel coupling with inert and noncorrosive thermoplastic lining; threaded ends; and 300 psig minimum working pressure at 225 deg F.

G. Dielectric Nipples:

- Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Perfection Corporation; a subsidiary of American Meter Company.
 - b. Precision Plumbing Products. Inc.
 - c. Sioux Chief Manufacturing Company, Inc.
- 2. Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300 psig minimum working pressure at 225 deg F.

2.7 VALVES

- A. Gate, Globe, Check, Ball, and Butterfly Valves: Comply with requirements specified in Division 23 Section, "General Duty Valves for HVAC Piping."
- B. Automatic Temperature Control Valves, Actuators, and Sensors: Comply with requirements specified in Division 23 Section, "Instrumentation and Control for HVAC."
- C. Bronze, Calibrated Orifice, Balancing Valves:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armstrong Pumps, Inc.
 - b. Bell & Gossett Domestic Pump; a division of ITT Industries.
 - c. Taco.
 - 2. Body: Bronze, ball or plug type with calibrated orifice or venturi.
 - 3. Ball: Brass or stainless steel.
 - 4. Plug: Resin.
 - 5. Seat: PTFE.
 - 6. End Connections: Threaded or solder.
 - 7. Pressure Gage Connections: Integral seals for portable differential pressure meter.

- 8. Handle Style: Lever, with memory stop to retain set position.
- 9. CWP Rating: Minimum 125 psig.
- 10. Maximum Operating Temperature: 250 deg F.
- D. Cast Iron or Steel, Calibrated Orifice, Balancing Valves:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armstrong Pumps, Inc.
 - b. Bell & Gossett Domestic Pump; a division of ITT Industries.
 - c. Taco.
 - 2. Body: Cast iron or steel body, ball, plug, or globe pattern with calibrated orifice or venturi.
 - 3. Ball: Brass or stainless steel.
 - 4. Stem Seals: EPDM O-rings.
 - 5. Disc: Glass and carbon-filled PTFE.
 - 6. Seat: PTFE.
 - 7. End Connections: Flanged.
 - 8. Pressure Gage Connections: Integral seals for portable differential pressure meter.
 - 9. Handle Style: Lever, with memory stop to retain set position.
 - 10. CWP Rating: Minimum 125 psig.
 - 11. Maximum Operating Temperature: 250 deg F.

2.8 AIR CONTROL DEVICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Amtrol, Inc.
 - 2. Armstrong Pumps, Inc.
 - 3. Bell & Gossett Domestic Pump; a division of ITT Industries.
 - 4. Taco.
- B. Manual Air Vents:
 - 1. Body: Bronze.
 - 2. Internal Parts: Nonferrous.
 - 3. Operator: Screwdriver or thumbscrew.
 - 4. Inlet Connection: NPS 1/2.
 - 5. Discharge Connection: NPS 1/8.
 - 6. CWP Rating: 150 psig.
 - 7. Maximum Operating Temperature: 225 deg F.
- C. Automatic Air Vents:
 - 1. Body: Bronze or cast iron.
 - 2. Internal Parts: Nonferrous.
 - 3. Operator: Noncorrosive metal float.
 - 4. Inlet Connection: NPS 1/2.
 - 5. Discharge Connection: NPS 1/4.
 - 6. CWP Rating: 150 psig.
 - 7. Maximum Operating Temperature: 240 deg F.

2.9 HYDRONIC PIPING SPECIALTIES

A. Y-Pattern Strainers:

- 1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
- 2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
- 3. Strainer Screen: 40 mesh startup strainer, and perforated stainless steel basket with 50 percent free area.
- CWP Rating: 125 psig.
- B. Stainless Steel, Braided, Flexible Connectors:
 - 1. Body: Corrugated hose and braid 300 series stainless steel.
 - 2. End Connections: Threaded or flanged to match equipment connected.
 - 3. Performance: Capable of 3/4-inch misalignment.
 - 4. CWP Rating: 150 psig.
 - 5. Maximum Operating Temperature: 250 deg F.
- C. Expansion fittings are specified in Division 23 Section, "Expansion Fittings and Loops for HVAC Piping."

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Hot and Chilled Water piping, aboveground, NPS 2-1/2 and smaller, shall be either of the following:
 - 1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
 - 2. Schedule 40 steel pipe; Class 125, cast iron fittings; cast iron flanges and flange fittings; and threaded joints.
- B. Hot and Chilled Water piping, aboveground, NPS 3 and larger, shall be the following:
 - 1. Schedule 40 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.
- C. Condensate-Drain Piping: Schedule 40 PVC plastic pipe and fittings and solvent-welded joints where condensate piping is not located within an active air plenum. For locations where condensate piping is located within an active air plenum type L, drawn temper copper tubing, wrought-copper fittings and soldered joints shall be used.
- D. Air-Vent Piping:
 - 1. Inlet: Same as service where installed.
 - 2. Outlet: Type L, drawn-temper copper tubing with soldered joints.

3.2 VALVE APPLICATIONS

A. Install calibrated orifice, balancing valves in the return pipe of each heating or cooling terminal.

3.3 PIPING INSTALLATIONS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Select system components with pressure rating equal to or greater than system operating pressure.
- K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- L. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- M. Install piping at a uniform grade of 0.2 percent upward in direction of flow.
- N. Reduce pipe sizes using eccentric reducer fitting installed with level side up.
- O. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.
- P. Install valves according to Division 23 Section, "General Duty Valves for HVAC Piping."
- Q. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.
- R. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.
- S. Install strainers on inlet side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 nipple and ball valve in blowdown connection of strainers NPS 2 and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2.
- T. Install expansion loops, expansion joints, anchors, and pipe alignment guides as specified in Division 23 Section, "Expansion Fittings and Loops for HVAC Piping."
- U. Identify piping as specified in Division 23 Section, "Identification for HVAC Piping and Equipment."
- V. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 23 Section, "Sleeves and Sleeve Seals for HVAC Piping."
- W. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 23 Section, "Sleeves and Sleeve Seals for HVAC Piping."

3.4 HANGERS AND SUPPORTS

- A. Hanger, support, and anchor devices are specified in Division 23 Section, "Hangers and Supports for HVAC Piping and Equipment." Comply with the following requirements for maximum spacing of supports.
- B. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
 - 2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.
 - 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.

- 4. Spring hangers to support vertical runs.
- 5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- 6. On plastic pipe, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.
- C. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 3/4: Maximum span, 7 feet; minimum rod size, 1/4 inch.
 - 2. NPS 1: Maximum span, 7 feet; minimum rod size, 1/4 inch.
 - 3. NPS 1-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 - 4. NPS 2: Maximum span, 10 feet; minimum rod size, 3/8 inch.
 - 5. NPS 2-1/2: Maximum span, 11 feet; minimum rod size, 3/8 inch.
 - 6. NPS 3: Maximum span, 12 feet; minimum rod size, 3/8 inch.
 - 7. NPS 4: Maximum span, 14 feet; minimum rod size, 1/2 inch.
 - 8. NPS 6: Maximum span, 17 feet; minimum rod size, 1/2 inch.
 - 9. NPS 8: Maximum span, 19 feet; minimum rod size, 5/8 inch.
- D. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 - 2. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
 - 3. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 4. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 5. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 - 6. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.
- E. Plastic Piping Hanger Spacing: Space hangers according to pipe manufacturer's written instructions for service conditions. Avoid point loading. Space and install hangers with the fewest practical rigid anchor points.
- F. Support vertical runs at roof, at each floor, and at 10-foot intervals between floors.

3.5 PIPE JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. PVC Nonpressure Piping: Join according to ASTM D 2855.

3.6 HYDRONIC SPECIALTIES INSTALLATION

- A. Install manual air vents at high points in piping, at heat transfer coils, and elsewhere as required for system air venting.
- B. Install automatic air vents at high points of system piping in mechanical equipment rooms only. Manual vents at heat transfer coils and elsewhere as required for air venting.

3.7 TERMINAL EQUIPMENT CONNECTIONS

- A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.
- B. Install control valves in accessible locations close to connected equipment.
- C. Install ports for pressure gages and thermometers at coil inlet and outlet connections according to Division 23 Section, "Meters and Gages for HVAC Piping."

3.8 CHEMICAL TREATMENT AND PIPE CLEANING

- A. Perform an initial analysis of system water to determine type and quantities of chemical treatment needed to keep system free of scale, corrosion, and fouling. After cleaning, flushing and chemical additions the following quality standards must be met.
 - 1. pH: 6.0 to 8.5.
 - 2. "P" Alkalinity: 100 to 500 ppm.
 - 3. Reserve alkalinity: Not less than 5 ppm.
 - 4. Total Suspended Solids: Maximum 10 ppm.
 - 5. Biological Counts: < 1000 cfu's.
 - 6. Iron: <1.0.
- B. New piping systems shall be cleaned independently prior to connection.
 - 1. Be sure that all system piping is open and receives good circulation during the cleaning process. All unit coils should be open and receive flow during the cleaning process.
 - 2. Provide a temporary 5 micron particulate size filtration system for use during the cleaning process.
 - 3. Flush low point drains, expansion tanks, control valves, and etc. while circulating to help remove any debris that has been dislodged.
 - 4. Flush with constant circulation until the water is relatively clear. If necessary, partially drain the system before adding the cleaning products.
 - 5. Use CHEM-AQUA 655T or similar, at a rate of 2.5 gallons per 1,000 gallons system volume. The system pH must be maintained between 7.0 and 8.0 during the cleaning process.
 - 6. If required, apply antifoam, use CHEM-AQUA FC-101 PLUS or similar, at 4 to 16 ounces per 1,000 gallons.
 - 7. Immediately fill the system back to normal operating level and circulate for 12 to 24 hours at ambient temperature.

- 8. When cleaning times are complete, open high point vent(s) and drain the system completely. Refill the system with fresh water and circulate to mix. If the system has an automatic fill valve, initiate a heavy bleed and flush the system until the water is clear and free of foam. The by-pass around the pressure reducing valve can be open to permit more flow. The pressure relief valve will prevent overpressurizing the system. Be sure to not bleed the system faster than makeup water is added to prevent air from entering the system. If flushing is not practical, the system should be repeatedly drained and filled until the water is clear.
- 9. System should be flushed until the phosphate level is less than 10 ppm.
 - a. Once target phosphate level is reached, add the recommended amount of inhibited glycol. Failure to add inhibitor could result in red water problems due to corrosion.
- C. Add initial chemical treatment to achieve water quality levels noted in this article. The system water must be tested and adjusted. pH can be adjusted down by making a solution of CHEM-AQUA BP-600 powder in water and adding to the system slowly to lower the pH within the specified range.
- D. Submit all water quality tests as part of the close-out documentation.
- E. Refer to drawing for additional notes.

3.9 FIELD QUALITY CONTROL

- A. Prepare hydronic piping according to ASME B31.9 and as follows:
 - 1. Leave joints, including welds, uninsulated and exposed for examination during test.
 - 2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
 - 3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
 - 4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
 - 5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
- B. Perform the following tests on hydronic piping:
 - 1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
 - 2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
 - 3. Isolate expansion tanks and determine that hydronic system is full of water.
 - 4. Test piping in accordance with the International Mechanical Code.
 - 5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
 - Prepare written report of testing.
- C. Perform the following before operating the system:
 - 1. Open manual valves fully.
 - 2. Inspect pumps for proper rotation.

- 3. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
- 4. Set temperature controls so all coils are calling for full flow.
- 5. Verify lubrication of motors and bearings.

END OF SECTION 232113

SECTION 232123 - HYDRONIC PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - Close-coupled, in-line centrifugal pumps.

1.3 DEFINITIONS

- A. Buna-N: Nitrile rubber.
- B. EPT: Ethylene propylene terpolymer.

1.4 SUBMITTALS

- A. Product Data: Include certified performance curves and rated capacities, operating characteristics, furnished specialties, final impeller dimensions, and accessories for each type of product indicated. Indicate pump's operating point on curves.
- B. Shop Drawings: Show pump layout and connections. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Operation and Maintenance Data: For pumps to include in emergency, operation, and maintenance manuals.
- D. Completed System Readiness Checklist provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 230800, COMMISSIONING OF HVAC SYSTEMS.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain hydronic pumps through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of hydronic pumps and are based on the specific system indicated. Refer to Division 01 Section, "Product Requirements."
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. UL Compliance: Comply with UL 778 for motor operated water pumps.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed in plugs.
- B. Store pumps in dry location.

- C. Retain protective covers for flanges and protective coatings during storage.
- D. Protect bearings and couplings against damage from sand, grit, and other foreign matter.
- E. Comply with pump manufacturer's written rigging instructions.

1.7 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Mechanical Seals: One mechanical seal(s) for each pump.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 CLOSE-COUPLED, IN-LINE CENTRIFUGAL PUMPS

- A. Available Manufacturers:
 - 1. Armstrong Pumps Inc.
 - 2. Bell & Gossett; Div. of ITT Industries.
 - 3. PACO Pumps.
 - 4. Taco, Inc.
- B. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, close-coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted horizontally or vertically. Rate pump for 175 psig minimum working pressure and a continuous water temperature of 225 deg F. Pumps shall be capable of being serviced without disturbing piping connections.
- C. Pump Construction:
 - 1. Casing: Radially split, cast iron, with replaceable bronze wear rings, threaded gage tappings at inlet and outlet, and flanged end connections.
 - 2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance.
 - 3. Pump Shaft: Steel, with bronze shaft sleeve.
 - 4. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless steel spring, and Buna-N bellows and gasket. Include water slinger on shaft between motor and seal.
 - 5. Pump Bearings: Permanently lubricated ball bearings.
- D. Motor: Shall meet scheduled horsepower, speed, voltage and enclosure design. Pump and motors shall be factory aligned, and shall be realigned after installation. Motors

shall be non-overloading at any point on the pump curve and shall meet NEMA specifications. Refer to pump schedules for additional motor requirements.

- E. Capacities and Characteristics:
 - Refer to schedules on drawings.

2.3 PUMP SPECIALTY FITTINGS

A. Triple-Duty Valve: Angle or straight pattern, 175 psig pressure rating, cast iron body, pump-discharge fitting; with drain plug and bronze-fitted shutoff, balancing, and check valve features. Brass gage ports with integral check valve, and orifice for flow measurement.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine equipment foundations and anchor bolt locations for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before pump installation.
- C. Examine foundations for suitable conditions where pumps are to be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PUMP INSTALLATION

- A. Comply with HI 1.4.
- B. Install pumps with access for periodic maintenance including removal of motors, impellers, couplings, and accessories.
- C. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.
- D. Install continuous-thread hanger rods and spring hangers of sufficient size to support pump weight. Vibration isolation devices are specified in Division 23 Section, "Vibration and Seismic Controls for HVAC Piping and Equipment." Fabricate brackets or supports as required. Hanger and support materials are specified in Division 23 Section, "Hangers and Supports for HVAC Piping and Equipment."

3.3 ALIGNMENT

- A. Align pump and motor shafts and piping connections after setting on foundation, grout has been set and foundation bolts have been tightened, and piping connections have been made.
- B. Comply with pump and coupling manufacturers' written instructions.
- C. Adjust pump and motor shafts for angular and offset alignment by methods specified in HI 1.1-1.5, "Centrifugal Pumps for Nomenclature, Definitions, Application and Operation".
- D. After alignment is correct, tighten foundation bolts evenly but not too firmly. Completely fill baseplate with nonshrink, nonmetallic grout while metal blocks and shims or wedges are in place. After grout has cured, fully tighten foundation bolts.

3.4 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

- B. Install piping adjacent to machine to allow service and maintenance.
- C. Connect piping to pumps. Install valves that are same size as piping connected to pumps.
- D. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.
- E. Refer to pump details on drawings for pump specialties.
- F. Install electrical connections for power, controls, and devices.

3.5 STARTUP SERVICE

- A. Perform startup service.
 - Complete installation and startup checks according to manufacturer's written instructions
 - 2. Check piping connections for tightness.
 - 3. Clean strainers on suction piping.
 - 4. Perform the following startup checks for each pump before starting:
 - a. Verify bearing lubrication.
 - b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
 - c. Verify that pump is rotating in the correct direction.
 - 5. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
 - 6. Start motor.
 - 7. Open discharge valve slowly.
- B. The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with COR and Commissioning Agent. Provide a minimum notice of 10 working days prior to startup and testing.

3.6 COMMISSIONING

- A. Provide commissioning documentation in accordance with the requirements of Section 230800, COMMISSIONING OF HVAC SYSTEMS.
- B. Components provided under this section of the specification will be tested as part of a larger system.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain hydronic pumps. Refer to Division 01 Section, "Demonstration and Training."

END OF SECTION 232123

SECTION 232300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes refrigerant piping used for air conditioning applications.

1.3 PERFORMANCE REQUIREMENTS

- A. Line Test Pressure for Refrigerant R-410A:
 - 1. Suction Lines for Air Conditioning Applications: 300 psig.
 - 2. Suction Lines for Heat Pump Applications: 535 psig.
 - 3. Hot Gas and Liquid Lines: 535 psig.

1.4 SUBMITTALS

- A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:
 - 1. Thermostatic expansion valves.
 - 2. Solenoid valves.
 - 3. Hot gas bypass valves.
 - 4. Filter dryers.
 - 5. Strainers.
 - 6. Pressure-regulating valves.
- B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.
 - 1. Shop Drawing Scale: 1/4 inch equals 1 foot.
 - 2. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.
- C. Welding certificates.
- D. Field quality control test reports.
- E. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
- C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.6 PRODUCT STORAGE AND HANDLING

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

1.7 COORDINATION

A. Coordinate size and location of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section, "Roof Accessories."

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Copper Tube: ASTM B 280, Type ACR.
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Wrought-Copper Unions: ASME B16.22.
- D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.
- E. Brazing Filler Metals: AWS A5.8.

2.2 VALVES AND SPECIALTIES

- A. Diaphragm Packless Valves:
 - 1. Body and Bonnet: Forged brass or cast bronze; globe design with straight through or angle pattern.
 - 2. Diaphragm: Phosphor bronze and stainless steel with stainless steel spring.
 - 3. Operator: Rising stem and hand wheel.
 - 4. Seat: Nylon.
 - 5. End Connections: Socket, union, or flanged.
 - 6. Working Pressure Rating: 500 psig.
 - 7. Maximum Operating Temperature: 275 deg F.

B. Packed Angle Valves:

- 1. Body and Bonnet: Forged brass or cast bronze.
- 2. Packing: Molded stem, back seating, and replaceable under pressure.
- 3. Operator: Rising stem.
- 4. Seat: Nonrotating, self-aligning polytetrafluoroethylene.
- 5. Seal Cap: Forged-brass or valox hex cap.
- 6. End Connections: Socket, union, threaded, or flanged.
- 7. Working Pressure Rating: 500 psig.
- 8. Maximum Operating Temperature: 275 deg F.

C. Check Valves:

- 1. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
- 2. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
- 3. Piston: Removable polytetrafluoroethylene seat.
- 4. Closing Spring: Stainless steel.
- 5. Manual Opening Stem: Seal cap, plated steel stem, and graphite seal.
- 6. End Connections: Socket, union, threaded, or flanged.
- 7. Maximum Opening Pressure: 0.50 psig.
- 8. Working Pressure Rating: 500 psig.
- 9. Maximum Operating Temperature: 275 deg F.

D. Service Valves:

- 1. Body: Forged brass with brass cap including key end to remove core.
- 2. Core: Removable ball-type check valve with stainless steel spring.
- 3. Seat: Polytetrafluoroethylene.

- 4. End Connections: Copper spring.
- 5. Working Pressure Rating: 500 psig.
- E. Solenoid Valves: Comply with ARI 760 and UL 429; listed and labeled by an NRTL.
 - 1. Body and Bonnet: Plated steel.
 - 2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
 - 3. Seat: Polytetrafluoroethylene.
 - 4. End Connections: Threaded.
 - 5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and 24-V ac coil.
 - 6. Working Pressure Rating: 400 psig.
 - 7. Maximum Operating Temperature: 240 deg F.
 - 8. Manual operator.
- F. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
 - 1. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
 - 2. Piston, Closing Spring, and Seat Insert: Stainless steel.
 - 3. Seat Disc: Polytetrafluoroethylene.
 - 4. End Connections: Threaded.
 - 5. Working Pressure Rating: 400 psig.
 - 6. Maximum Operating Temperature: 240 deg F.
- G. Thermostatic Expansion Valves: Comply with ARI 750.
 - 1. Body, Bonnet, and Seal Cap: Forged brass or steel.
 - 2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
 - 3. Packing and Gaskets: Non-asbestos.
 - 4. Capillary and Bulb: Copper tubing filled with refrigerant charge.
 - 5. Suction Temperature: 40 deg F.
 - 6. Superheat: Adjustable.
 - 7. Reverse-flow option (for heat pump applications).
 - 8. End Connections: Socket, flare, or threaded union.
 - 9. Working Pressure Rating: 700 psig.
- H. Hot Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.
 - 1. Body, Bonnet, and Seal Cap: Ductile iron or steel.
 - 2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
 - 3. Packing and Gaskets: Non-asbestos.
 - 4. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
 - 5. Seat: Polytetrafluoroethylene.
 - 6. Equalizer: Internal.
 - 7. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and 24-V ac coil.
 - 8. End Connections: Socket.
 - 9. Throttling Range: Maximum 5 psig.
 - 10. Working Pressure Rating: 500 psig.
 - 11. Maximum Operating Temperature: 240 deg F.
- I. Straight-Type Strainers:
 - 1. Body: Welded steel with corrosion-resistant coating.
 - 2. Screen: 100-mesh stainless steel.
 - 3. End Connections: Socket or flare.
 - 4. Working Pressure Rating: 500 psig.
 - 5. Maximum Operating Temperature: 275 deg F.
- J. Angle-Type Strainers:

- 1. Body: Forged brass or cast bronze.
- 2. Drain Plug: Brass hex plug.
- 3. Screen: 100-mesh monel.
- 4. End Connections: Socket or flare.
- 5. Working Pressure Rating: 500 psig.
- 6. Maximum Operating Temperature: 275 deg F.

K. Moisture/Liquid Indicators:

- 1. Body: Forged brass.
- 2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
- 3. Indicator: Color coded to show moisture content in ppm.
- 4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
- 5. End Connections: Socket or flare.
- 6. Working Pressure Rating: 500 psig.
- 7. Maximum Operating Temperature: 240 deg F.
- L. Replaceable-Core Filter Dryers: Comply with ARI 730.
 - 1. Body and Cover: Painted steel shell with ductile iron cover, stainless steel screws, and neoprene gaskets.
 - 2. Filter Media: 10 micron, pleated with integral end rings; stainless steel support.
 - 3. Desiccant Media: Activated alumina.
 - 4. Designed for reverse flow (for heat pump applications).
 - 5. End Connections: Socket.
 - 6. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.
 - 7. Maximum Pressure Loss: 2 psig.
 - 8. Working Pressure Rating: 500 psig.
 - 9. Maximum Operating Temperature: 240 deg F.
- M. Permanent Filter Dryers: Comply with ARI 730.
 - 1. Body and Cover: Painted steel shell.
 - 2. Filter Media: 10 micron, pleated with integral end rings; stainless steel support.
 - 3. Desiccant Media: Activated alumina.
 - 4. Designed for reverse flow (for heat pump applications).
 - 5. End Connections: Socket.
 - 6. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.
 - 7. Maximum Pressure Loss: 2 psig.
 - 8. Working Pressure Rating: 500 psig.
 - 9. Maximum Operating Temperature: 240 deg F.

N. Mufflers:

- 1. Body: Welded steel with corrosion-resistant coating.
- 2. End Connections: Socket or flare.
- 3. Working Pressure Rating: 500 psig.
- 4. Maximum Operating Temperature: 275 deg F.
- O. Receivers: Comply with ARI 495.
 - 1. Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
 - 2. Comply with UL 207; listed and labeled by an NRTL.
 - 3. Body: Welded steel with corrosion-resistant coating.
 - 4. Tappings: Inlet, outlet, liquid level indicator, and safety relief valve.
 - 5. End Connections: Socket or threaded.

- 6. Working Pressure Rating: 500 psig.
- 7. Maximum Operating Temperature: 275 deg F.
- P. Liquid Accumulators: Comply with ARI 495.
 - 1. Body: Welded steel with corrosion-resistant coating.
 - 2. End Connections: Socket or threaded.
 - 3. Working Pressure Rating: 500 psig.
 - 4. Maximum Operating Temperature: 275 deg F.

2.3 REFRIGERANTS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Atofina Chemicals, Inc.
 - 2. DuPont Company; Fluorochemicals Div.
 - 3. Honeywell, Inc.; Genetron Refrigerants.
 - INEOS Fluor Americas LLC.
- B. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

- A. Suction Lines NPS 3-1/2 and Smaller for Conventional Air Conditioning Applications: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
- B. Hot Gas and Liquid Lines and Suction Lines for Heat Pump Applications: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
- C. Safety Relief Valve Discharge Piping: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

- A. Install packed-angle valves in suction and discharge lines of compressor.
- B. Install service valves for gage taps at inlet and outlet of hot gas bypass valves and strainers if they are not an integral part of valves and strainers.
- C. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.
- D. Except as otherwise indicated, install packed-angle valves on inlet and outlet side of filter dryers.
- E. Install a full-sized, three-valve bypass around filter dryers.
- F. Install solenoid valves upstream from each expansion valve and hot gas bypass valve. Install solenoid valves in horizontal lines with coil at top.
- G. Install thermostatic expansion valves as close as possible to distributors on evaporators.
 - 1. Install valve so diaphragm case is warmer than bulb.
 - 2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
 - 3. If external equalizer lines are required, make connection where it will reflect suction line pressure at bulb location.

- H. Install safety relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety relief valve discharge line to outside according to ASHRAE 15.
- I. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.
- J. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:
 - Solenoid valves.
 - 2. Thermostatic expansion valves.
 - 3. Hot gas bypass valves.
 - 4. Compressor.
- K. Install filter dryers in liquid line between compressor and thermostatic expansion valve and in the suction line at the compressor.
- L. Install receivers sized to accommodate pump-down charge.

3.3 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.
- B. Install refrigerant piping according to ASHRAE 15.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping adjacent to machines to allow service and maintenance.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Refer to Division 23 Sections, "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls" for solenoid valve controllers, control wiring, and sequence of operation.
- J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- K. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Division 08 Section, "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.
- L. Slope refrigerant piping as follows:
 - 1. Install horizontal hot gas discharge piping with a uniform slope downward away from compressor.
 - 2. Install horizontal suction lines with a uniform slope downward to compressor.
 - 3. Install traps and double risers to entrain oil in vertical runs.
 - 4. Liquid lines may be installed level.
- M. When brazing or soldering, remove solenoid valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion valve bulb.

- N. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- O. Identify refrigerant piping and valves according to Division 23 Section, "Identification for HVAC Piping and Equipment."
- P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 23 Section, "Sleeves and Sleeve Seals for HVAC Piping."
- Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 23 Section, "Sleeves and Sleeve Seals for HVAC Piping."
- R. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.4 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.
- D. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 - 1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
 - 2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.
- F. Welded Joints: Construct joints according to AWS D10.12/D10.12M.
- G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.5 HANGERS AND SUPPORTS

- A. Hanger, support, and anchor products are specified in Division 23 Section, "Hangers and Supports for HVAC Piping and Equipment."
- B. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
 - 2. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
 - 2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
 - 3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
 - 4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 6. NPS 2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 7. NPS 2-1/2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 - 8. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.
 - 9. NPS 4: Maximum span, 12 feet; minimum rod size, 1/2 inch.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. Comply with ASME B31.5, Chapter VI.
 - 2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure. Test piping in accordance with the Mechanical Code of New York State.
 - 3. Test high and low pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
 - a. Fill system with nitrogen to the required test pressure.
 - b. System shall maintain test pressure at the manifold gage throughout duration of test.
 - c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
 - d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.7 SYSTEM CHARGING

- A. Charge system using the following procedures:
 - 1. Install core in filter dryers after leak test but before evacuation.
 - 2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
 - 3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
 - 4. Charge system with a new filter-dryer core in charging line.

3.8 ADJUSTING

- A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.
- B. Adjust high and low pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
- C. Adjust set point temperature of air conditioning or chilled water controllers to the system design temperature.
- D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
 - 1. Open shutoff valves in condenser water circuit.
 - 2. Verify that compressor oil level is correct.
 - 3. Open compressor suction and discharge valves.
 - 4. Open refrigerant valves except bypass valves that are used for other purposes.
 - 5. Check open compressor-motor alignment and verify lubrication for motors and bearings.
- E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 232300

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Single-wall rectangular ducts and fittings.
 - 2. Single-wall round ducts and fittings.
 - 3. Sheet metal materials.
 - Duct liner.
 - 5. Sealants and gaskets.
 - 6. Hangers and supports.
- B. Related Sections:
 - 1. Division 23 Section, "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
 - 2. Division 23 Section, "Air Duct Accessories" for dampers, sound control devices, duct mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards Metal and Flexible".
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

1.4 SUBMITTALS

- A. Product Data: For each type of the following products:
 - Liners and adhesives.
 - Sealants and gaskets.
- B. Shop Drawings:
 - 1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 - 2. Factory- and shop-fabricated ducts and fittings.
 - 3. Duct layout indicating sizes, configuration, liner material, and static pressure classes.
 - 4. Elevation of top of ducts.
 - 5. Dimensions of main duct runs from building grid lines.
 - 6. Fittings.
 - 7. Reinforcement and spacing.
 - 8. Seam and joint construction.

- 9. Penetrations through fire rated and other partitions.
- 10. Equipment installation based on equipment being used on Project.
- 11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
- 12. Hangers and supports, including methods for duct and building attachment and vibration isolation.
- C. Delegated-Design Submittal:
 - 1. Sheet metal thicknesses.
 - 2. Joint and seam construction and sealing.
 - 3. Reinforcement details and spacing.
 - 4. Materials, fabrication, assembly, and spacing of hangers and supports.
- D. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 - 2. Suspended ceiling components.
 - 3. Structural members to which duct will be attached.
 - 4. Size and location of initial access modules for acoustical tile.
 - 5. Penetrations of smoke barriers and fire rated construction.
 - 6. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Perimeter moldings.
- E. Welding certificates.
- F. Field quality control reports.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel," for hangers and supports. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 "Systems and Equipment" and Section 7 "Construction and System Start-Up."
- C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6.4.4 "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" based on indicated static pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static pressure class, applicable sealing requirements, materials involved, duct support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."

- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 1-5, "Longitudinal Seams Rectangular Ducts," for static pressure class, applicable sealing requirements, materials involved, duct support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards -Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static pressure class, applicable sealing requirements, materials involved, duct support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static pressure class unless otherwise indicated.
 - 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. Lindab Inc.
 - b. McGill AirFlow LLC.
 - c. SEMCO Incorporated.
 - d. Sheet Metal Connectors, Inc.
 - e. Spiral Manufacturing Co., Inc.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-2, "Transverse Joints Round Duct," for static pressure class, applicable sealing requirements, materials involved, duct support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-1, "Seams Round Duct and Fittings," for static pressure class, applicable sealing requirements, materials involved, duct support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."
- D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees," for static pressure class, applicable sealing requirements, materials involved, duct support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - Galvanized Coating Designation: G60.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.

- C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 DUCT LINER

- A. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1; and with NFPA 90A or NFPA 90B.
 - 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. Aeroflex USA Inc.
 - b. Armacell LLC.
 - c. Rubatex International, LLC
 - 2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
 - 3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Insulation Pins and Washers:

- 1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon steel washer.
- 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- C. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 2-19, "Flexible Duct Liner Installation."
 - 1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
 - 2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
 - 3. Butt transverse joints without gaps, and coat joint with adhesive.
 - 4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
 - 5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
 - 6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm.
 - 7. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
 - 8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:

- a. Fan discharges.
- b. Intervals of lined duct preceding unlined duct.
- c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm or where indicated.
- 9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
 - a. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.
- 10. Terminate inner ducts with buildouts attached to fire damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.5 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
 - 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 - 2. Tape Width: 3 inches.
 - 3. Sealant: Modified styrene acrylic.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. Maximum Static Pressure Class: 10-inch wg, positive and negative.
 - 7. Service: Indoor and outdoor.
 - 8. Service Temperature: Minus 40 to plus 200 deg F.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
 - 10. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Water-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Solids Content: Minimum 65 percent.
 - 3. Shore A Hardness: Minimum 20.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. VOC: Maximum 75 g/L (less water).
 - 7. Maximum Static Pressure Class: 10-inch wg, positive and negative.
 - 8. Service: Indoor or outdoor.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- D. Flanged Joint Sealant: Comply with ASTM C 920.
 - 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.

- 6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- F. Round Duct Joint O-Ring Seals:
 - 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static pressure class, positive or negative.
 - 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
 - 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."
- C. Steel Cables for Galvanized Steel Ducts: Galvanized steel complying with ASTM A 603.
- D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic locking and clamping device.
- E. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- F. Trapeze and Riser Supports:
 - 1. Supports for Galvanized Steel Ducts: Galvanized steel shapes and plates.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible" unless otherwise indicated.
- C. Install round ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation

- with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section, "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials.

3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

- A. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible":
 - 1. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible."

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Chapter 4, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 2. Use powder-actuated concrete fasteners for standard weight aggregate concretes or for slabs more than 4 inches thick.
 - 3. Do not use powder-actuated concrete fasteners for lightweight aggregate concretes or for slabs less than 4 inches thick.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pullout, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized steel primer. Paint materials and application requirements are specified in Division 09 painting Sections.

3.6 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Division 23 Section, "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Duct System Cleanliness Tests:
 - 1. Visually inspect duct system to ensure that no visible contaminants are present.
- C. Duct system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.8 START UP

A. Air Balance: Comply with requirements in Division 23 Section, "Testing, Adjusting, and Balancing for HVAC."

3.9 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows.
- B. Ducts:
 - 1. Ducts Connected to Fan Coil Units:
 - a. Pressure Class: Positive 1-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 - 2. Ducts Connected to Constant Volume Air Handling Units:
 - a. Pressure Class: Positive 4-inch wg
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
 - 3. Ducts Connected to Variable Air Volume Air Handling Units:
 - a. Pressure Class: Positive 4-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
 - 4. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive or negative 3-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
- C. Intermediate Reinforcement:
 - 1. Galvanized Steel Ducts: Galvanized steel.
- D. Liner:

1. Flexible elastomeric, 1 inch thick. Duct liner not required for exhaust ductwork serving fume hoods and laser engravers.

E. Elbow Configuration:

- 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 2-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
 - c. Velocity 1500 fpm or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
- 2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-3, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.
- F. Branch Configuration:
 - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible." Figure 2-6, "Branch Connections."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.
 - 2. Round: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm or Lower: 90-degree tap.
 - b. Velocity 1000 to 1500 fpm: Conical tap.
 - c. Velocity 1500 fpm or Higher: 45-degree lateral.

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END OF SECTION 233113

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METAL DUCTS

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Backdraft and pressure relief dampers.
 - 2. Manual volume dampers.
 - 3. Control dampers.
 - 4. Fire dampers.
 - 5. Combination fire and smoke dampers.
 - 6. Smoke dampers.
 - 7. Flange connectors.
 - 8. Turning vanes.
 - 9. Duct-mounted access doors.
 - 10. Flexible connectors.
 - 11. Flexible ducts.
 - 12. Duct accessory hardware.
- B. Related Sections:
 - 1. Division 28 Section, "Fire Detection and Alarm" for duct-mounted fire and smoke detectors.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
 - Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.
 - c. Control damper installations.
 - d. Fire damper, smoke damper, combination fire and smoke damper installations, including sleeves; and duct-mounted access doors.
 - e. Wiring Diagrams: For power, signal, and control wiring.
- C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.
- D. Source quality control reports.
- E. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with AMCA 500-D testing for damper rating.

1.5 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fusible Links: Furnish 2.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60.
 - 2. Exposed Surface Finish: Mill phosphatized.
- C. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless steel ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 BACKDRAFT AND PRESSURE RELIEF DAMPERS

- 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. Duro Dyne Inc.
 - 2. Greenheck Fan Corporation.
 - 3. Nailor Industries Inc.
 - 4. Pottorff; a division of PCI Industries, Inc.
 - 5. Ruskin Company.
- B. Description: Gravity balanced.
- C. Maximum Air Velocity: 2500 fpm.
- D. Maximum System Pressure: 1-inch wg.
- E. Frame: 18 gauge, galvanized sheet steel, with welded corners.
- F. Blades: Multiple single-piece blades, maximum 6-5/8-inch width, 0.025-inch- thick, roll-formed aluminum with sealed edges.
- G. Blade Action: Parallel.
- H. Blade Seals: Vinyl
- I. Blade Axles:
 - 1. Material: Plated steel
 - 2. Diameter: 3/16-inch.
- J. Tie Bars and Brackets: Galvanized steel.
- K. Return Spring: Adjustable tension.
- L. Bearings: Synthetic pivot bushings

M. Accessories:

- 1. Adjustment device to permit setting for varying differential static pressure.
- 2. Counterweights and spring-assist kits for vertical airflow installations.

2.3 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Manual Volume Dampers:
 - 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. Flexmaster U.S.A., Inc.
 - b. McGill AirFlow LLC.
 - c. METALAIRE, Inc.
 - d. Nailor Industries Inc.
 - e. Pottorff; a division of PCI Industries, Inc.
 - f. Ruskin Company.
 - 2. Standard leakage rating with linkage outside airstream.
 - 3. Suitable for horizontal or vertical applications.
 - 4. Frames:
 - a. Hat-shaped, galvanized steel channels, 0.064-inch minimum thickness.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
 - 5. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized steel, 0.064 inch thick.
 - 6. Blade Axles: Galvanized steel.

7. Bearings:

- a. Molded synthetic.
- b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
- 8. Tie Bars and Brackets: Galvanized steel.

B. Jackshaft:

- 1. Size: 1-inch diameter.
- 2. Material: Galvanized steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple damper assemblies.
- 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple damper assembly.
- C. Damper Hardware:
 - 1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zincplated steel, and a 3/4-inch hexagon locking nut.
 - 2. Include center hole to suit damper operating rod size.
 - 3. Include elevated platform for insulated duct mounting.

2.4 CONTROL DAMPERS

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. Duro Dyne Inc.
- 2. Flexmaster U.S.A., Inc.
- 3. Greenheck Fan Corporation.
- 4. McGill AirFlow LLC.
- 5. METALAIRE, Inc.
- 6. Nailor Industries Inc.
- 7. Ruskin Company.
- B. Low leakage rating with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
- C. Frames:
 - 1. Hat shaped.
 - 2. Galvanized steel channels, 0.064 inch thick.
 - 3. Mitered and welded corners.
- D. Blades:
 - 1. Multiple blade with maximum blade width of 8 inches.
 - 2. Parallel- and opposed blade design.
 - Galvanized steel.
 - 4. 0.064 inch thick.
 - 5. Blade Edging: Closed-cell neoprene edging.
 - 6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.
- E. Blade Axles: 1/2-inch- diameter; galvanized steel; blade linkage hardware of zincplated steel and brass; ends sealed against blade bearings.
 - 1. Operating Temperature Range: From minus 40 to plus 200 deg F.
- F. Bearings:
 - 1. Molded synthetic.
 - 2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - 3. Thrust bearings at each end of every blade.

2.5 FIRE DAMPERS

- 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. Greenheck Fan Corporation.
 - 2. McGill AirFlow LLC.
 - 3. METALAIRE, Inc.
 - 4. Nailor Industries Inc.
 - 5. Pottorff; a division of PCI Industries, Inc.
 - 6. Ruskin Company.
- B. Type: Dynamic: rated and labeled according to UL 555 by an NRTL.
- C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000 FPM velocity.
- D. Fire Rating: 1-1/2 hours.
- E. Frame: Curtain type with blades outside airstream fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.
- F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.
 - 1. Minimum Thickness: 0.052 or 0.138 inch thick, as indicated, and of length to suit application.

- 2. Exception: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.
- G. Mounting Orientation: Vertical or horizontal as indicated.
- H. Blades: Roll-formed, interlocking, 0.034-inch- thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized steel blade connectors.
- I. Horizontal Dampers: Include blade lock and stainless steel closure spring.
- J. Heat Responsive Device: Replaceable, 165 deg F rated, fusible links.

2.6 SMOKE DAMPERS

- 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. Air Balance Inc.; a division of Mestek, Inc.
 - 2. Cesco Products; a division of Mestek, Inc.
 - 3. Greenheck Fan Corporation.
 - 4. Nailor Industries Inc.
 - 5. PHL, Inc.
 - 6. Ruskin Company.
- B. General Requirements: Label according to UL 555S by an NRTL.
- C. Smoke Detector: Integral, factory wired for single-point connection.
- D. Frame: Curtain type with blades outside airstream fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.
- E. Blades: Roll-formed, horizontal, interlocking, 0.034-inch- thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized steel blade connectors.
- F. Leakage: Class I.
- G. Rated pressure and velocity to exceed design airflow conditions.
- H. Smoke Detector: Provided by others, installed by mechanical contractor in ductwork.
- I. Mounting Sleeve: Factory-installed, 0.052-inch- thick, galvanized sheet steel; length to suit wall or floor application.
- J. Damper Motors: Two-position action.
- K. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section, "Common Motor Requirements for HVAC Equipment."
 - 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - 2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 23 Section, "Instrumentation and Control for HVAC." and Division 26 Sections.
 - 3. Permanent-Split-Capacitor or Shaded Pole Motors: With oil-immersed and sealed gear trains.
 - 4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.
 - 5. Outdoor Motors and Motors in Outdoor Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.

- 6. Nonspring Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
- 7. Electrical Connection: 115 V, single phase, 60 Hz.
- L. Accessories:
 - 1. Auxiliary switches for signaling and fan control.
 - 2. Test and reset switches, damper mounted.

2.7 COMBINATION FIRE AND SMOKE DAMPERS

- 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. Air Balance Inc.; a division of Mestek, Inc.
 - 2. Cesco Products; a division of Mestek, Inc.
 - 3. Greenheck Fan Corporation.
 - 4. Nailor Industries Inc.
 - 5. Ruskin Company.
- B. Type: Dynamic; rated and labeled according to UL 555 and UL 555S by an NRTL.
- C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000-fpm velocity.
- D. Fire Rating: 1-1/2 hours.
- E. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.
- F. Heat Responsive Device: Replaceable, 165 deg F rated, fusible links.
- G. Heat Responsive Device: Electric resettable link and switch package, factory installed, rated.
- H. Smoke Detector: Provided by others, installed by mechanical contractor in ductwork.
- I. Blades: Roll-formed, horizontal, interlocking, 0.034-inch- thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized steel blade connectors.
- J. Leakage: Class I.
- K. Rated pressure and velocity to exceed design airflow conditions.
- L. Mounting Sleeve: Factory-installed, 0.052-inch- thick, galvanized sheet steel; length to suit wall or floor application.
- M. Master control panel for use in dynamic smoke management systems.
- N. Damper Motors: Two-position action.
- O. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section, "Common Motor Requirements for HVAC Equipment."
 - 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - 2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 23 Section, "Instrumentation and Control for HVAC." and Division 26 Sections.
 - 3. Permanent-Split-Capacitor or Shaded Pole Motors: With oil-immersed and sealed gear trains.
 - 4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.

- 5. Outdoor Motors and Motors in Outdoor Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.
- 6. Nonspring Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
- 7. Electrical Connection: 115 V, single phase, 60 Hz.

P. Accessories:

- 1. Auxiliary switches for signaling and fan control.
- 2. Test and reset switches, damper mounted.

2.8 FLANGE CONNECTORS

- 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. Ductmate Industries, Inc.
 - 2. Nexus PDQ; Division of Shilco Holdings Inc.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
- C. Material: Galvanized steel.
- D. Gage and Shape: Match connecting ductwork.

2.9 TURNING VANES

- 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. Ductmate Industries, Inc.
 - 2. Duro Dvne Inc.
 - 3. METALAIRE, Inc.
 - 4. SEMCO Incorporated.
 - 5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
 - 1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous glass fill.
- C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible"; Figures 2-3, "Vanes and Vane Runners," and 2-4, "Vane Support in Elbows."
- D. Vane Construction: Double wall.

2.10 DUCT-MOUNTED ACCESS DOORS

- 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. Ductmate Industries, Inc.
 - Flexmaster U.S.A., Inc.
 - 3. Greenheck Fan Corporation.
 - 4. McGill AirFlow LLC.
 - 5. Nailor Industries Inc.

- 6. Pottorff; a division of PCI Industries, Inc.
- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels Round Duct."
 - 1. Door:
 - a. Double wall, rectangular.
 - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
 - d. Fabricate doors airtight and suitable for duct pressure class.
 - 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 - 3. Number of Hinges and Locks:
 - a. Access Doors Less than 12 Inches Square: No hinges and two sash locks.
 - b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
 - c. Access Doors up to 24 by 48 Inches: Three hinges and two compression latches with outside and inside handles.

2.11 FLEXIBLE CONNECTORS

- 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. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.
 - 3. Ventfabrics. Inc.
 - 4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Materials: Flame retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Metal Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to 2 strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - Minimum Weight: 26 oz./sq. yd..
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 40 to plus 200 deg F.
- F. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle iron brackets for attaching to fan discharge and duct.
 - Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
 - 2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 - 7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.12 FLEXIBLE DUCTS

- 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. Flexmaster U.S.A., Inc.
 - 2. McGill AirFlow LLC.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous glass insulation; [polyethylene] [aluminized] vapor barrier film.
 - 1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
 - 2. Maximum Air Velocity: 4000 fpm.
 - 3. Temperature Range: Minus 10 to plus 160 deg F.
 - 4. Insulation R-value: See drawings.
- C. Flexible Duct Connectors:
 - 1. Clamps: Stainless steel band with cadmium-plated hex screw to tighten band with a worm gear action in sizes 3 through 18 inches, to suit duct size.

2.13 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized steel accessories in galvanized steel.
- C. Install backdraft and control dampers where indicated on plans and in controls specifications.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 - 1. Install steel volume dampers in steel ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install fire, smoke and combination fire smoke dampers according to UL listing.
- H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On upstream side of duct coils.
 - 2. Adjacent to and close enough to fire dampers, smoke dampers, or combination fire smoke dampers to reset or reinstall fusible links.
- I. Install access doors with swing against duct static pressure.
- J. Access Door Sizes:
 - 1. Body Access: 25 by 14 inches.

- K. Label access doors according to Division 23 Section, "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- L. Install flexible connectors to connect ducts to equipment.
- M. Install duct test holes where required for testing and balancing purposes.
- N. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.
 - 2. Inspect locations of access doors and verify that purpose of access door can be performed.
 - 3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
 - 4. Inspect turning vanes for proper and secure installation.

END OF SECTION 233300

SECTION 233423 - HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - Centrifugal roof ventilators.

1.3 PERFORMANCE REQUIREMENTS

- A. Project Altitude: Base fan performance ratings on sea level.
- B. Operating Limits: Classify according to AMCA 99.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:
 - 1. Certified fan performance curves with system operating conditions indicated.
 - 2. Certified fan sound power ratings.
 - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 4. Material thickness and finishes, including color charts.
 - 5. Dampers, including housings, linkages, and operators.
 - 6. Roof curbs.
 - 7. Fan speed controllers.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 - 1. Roof framing and support members relative to duct penetrations.
 - 2. Ceiling suspension assembly members.
 - 3. Size and location of initial access modules for acoustical tile.
 - 4. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- D. Field quality control reports.
- E. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.
- F. Completed System Readiness Checklist provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 230800, COMMISSIONING OF HVAC SYSTEMS.

1.5 QUALITY ASSURANCE

- A. 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.
- B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.
- C. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

1.6 COORDINATION

- A. Coordinate size and location of structural steel support members.
- B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL ROOF VENTILATORS

- 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. Carnes Company.
 - 2. Greenheck Fan Corporation.
 - 3. Loren Cook Company.
 - 4. PennBarry.
- B. Housing: Removable, spun aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.
- C. Fan Wheels: Aluminum hub and wheel with backward inclined blades.
- D. Accessories:
 - Refer to schedules on drawings.
- E. Capacities and Characteristics:
 - Refer to schedules on drawings.

2.2 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section, "Common Motor Requirements for HVAC Equipment."
 - 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - 2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.
- B. Enclosure Type: Totally enclosed, fan cooled.

2.3 SOURCE QUALITY CONTROL

- A. Certify sound power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory

Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install power ventilators level and plumb.
- B. Support units using spring isolators having a static deflection of 1 inch. Vibration and seismic control devices are specified in Division 23 Section, "Vibration and Seismic Controls for HVAC Piping and Equipment."
- C. Secure roof-mounted fans to roof curbs with cadmium-plated hardware. See Division 07 Section, "Roof Accessories" for installation of roof curbs.
- D. Support suspended units from structure using threaded steel rods and spring hangers having a static deflection of 1 inch. Vibration control devices are specified in Division 23 Section, "Vibration and Seismic Controls for HVAC Piping and Equipment."
- E. Install units with clearances for service and maintenance.
- F. Label units according to requirements specified in Division 23 Section, "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section, "Air Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment according to Division 26 Section, "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Division 26 Section, "Low Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that cleaning and adjusting are complete.
 - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system.
 - 5. Adjust damper linkages for proper damper operation.
 - 6. Verify lubrication for bearings and other moving parts.
 - 7. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.

- 8. Disable automatic temperature control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
- 9. Shut unit down and reconnect automatic temperature control operators.
- 10. Remove and replace malfunctioning units and retest as specified above.
- C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Prepare test and inspection reports.

3.4 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Comply with requirements in Division 23 Section, "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.
- D. Replace fan and motor pulleys as required to achieve design airflow.
- E. Lubricate bearings.

3.5 STARTUP SERVICE

- A. Perform startup service.
 - Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Verify that inlet duct connections are as recommended by manufacturer to achieve proper performance.
 - 3. Verify that controls and control enclosure are accessible.
 - 4. Verify that control connections are complete.
 - 5. Verify that nameplate and identification tag are visible.
 - 6. Verify that controls respond to inputs as specified.
- B. The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with COR and Commissioning Agent. Provide a minimum notice of 10 working days prior to startup and testing.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain units.

3.7 COMMISSIONING

- A. Provide commissioning documentation in accordance with the requirements of Section 230800, COMMISSIONING OF HVAC SYSTEMS.
- B. Components provided under this section of the specification will be tested as part of a larger system.

END OF SECTION 233423

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - Square ceiling diffusers.
 - 2. Linear slot diffusers.
 - 3. Adjustable bar registers and grilles.
 - 4. Fixed face registers and grilles.
- B. Related Sections:
 - 1. Division 23 Section, "Air Duct Accessories" for fire and volume control dampers not integral to diffusers, registers, and grilles.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
 - Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static pressure drop, and noise ratings.
 - 2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.
 - 3. Manufacturer's standard color chart for finish selection.
- B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 - 1. Ceiling suspension assembly members.
 - 2. Method of attaching hangers to building structure.
 - 3. Size and location of initial access modules for acoustical tile.
 - 4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 - 5. Duct access panels.
- C. Samples for Verification: Linear bar and slot diffusers to verify color selected.
- D. Source quality control reports.

PART 2 - PRODUCTS

2.1 CEILING DIFFUSERS

- A. Square Ceiling Diffusers (CD-A):
 - 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. Anemostat Products; a Mestek company.
 - b. Carnes.
 - c. Hart & Cooley Inc.

- d. Krueger.
- e. METALAIRE, Inc.
- f. Nailor Industries Inc.
- g. Price Industries.
- h. Titus.
- i. Tuttle & Bailey.
- 2. Devices shall be specifically designed for variable air volume flows.
- 3. Material: 24 gauge steel, with one piece precision die-stamped cones.
- 4. Finish: Baked enamel, color as selected by architect.
- 5. Face Size: Refer to schedule on drawings.
- 6. Face Style: Three cone.
- 7. Mounting: T-bar.
- 8. Pattern: Fixed.
- 9. Dampers: Radial opposed blade.

2.2 LINEAR OUTLETS / INLETS

- A. Linear Slot Diffuser (LD-A):
 - 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. Anemostat Products; a Mestek company.
 - b. Carnes.
 - c. Hart & Cooley Inc.
 - d. Krueger.
 - e. METALAIRE, Inc.
 - f. Nailor Industries Inc.
 - g. Price Industries.
 - h. Titus.
 - i. Tuttle & Bailey.
 - 2. Devices shall be specifically designed for variable air volume flows.
 - 3. Material Shell: Aluminum.
 - 4. Material Pattern Controller and Tees: Aluminum.
 - 5. Finish Face and Shell: Baked enamel, color as selected by architect.
 - 6. Finish Pattern Controller: Baked enamel, color as selected by architect.
 - 7. Finish Tees: Baked enamel, color as selected by architect.
 - 8. Slot Width: 1 inch.
 - 9. Number of Slots: One.
 - 10. Length: Refer to drawings.
 - 11. Accessories: Refer to drawings.

2.3 REGISTERS AND GRILLES

- A. Fixed Face Registers and Grilles (RR-A, RG-A, ER-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:
 - a. Anemostat Products; a Mestek company.
 - b. Carnes.
 - c. Hart & Cooley Inc.
 - d. Krueger.
 - e. Nailor Industries Inc.

- f. Price Industries.
- g. Titus.
- h. Tuttle & Bailey.
- 2. Material: Steel with 7/8" wide border on all sides and a minimum border gauge of 20. Corners shall be assembled with full penetration resistance welds. Blades shall have a minimum gauge of 20 with a fixed deflection of 35 degrees.
- 3. Finish: Baked enamel, color as selected by architect.
- 4. Face Arrangement: Aeroblade blades with 3/4" blade spacing. Blades shall be parallel to the long dimension.
- 5. Damper Type (Registers Only): Adjustable opposed blade.
- B. Adjustable Bar Register (SR-A):
 - 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. Anemostat Products; a Mestek company.
 - b. Carnes.
 - c. Hart & Cooley Inc.
 - d. Krueger.
 - e. METALAIRE, Inc.
 - f. Nailor Industries Inc.
 - g. Price Industries.
 - h. Titus.
 - i. Tuttle & Bailey.
 - 2. Material: Steel.
 - 3. Finish: Baked enamel, color as selected by architect.
 - 4. Face Blade Arrangement: Horizontal to long dimension spaced 3/4 inch apart.
 - 5. Rear Blade Arrangement: Vertical spaced 3/4 inch apart.
 - 6. Core Construction: Integral.
 - 7. Frame: 7/8 inch wide.
 - 8. Damper Type: Adjustable opposed blade.
- C. Eggcrate Registers (ER-A AND RG-B):

2.4 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in

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- lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713

SECTION 238126 - SPLIT-SYSTEM AIR CONDITIONERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes split-system air conditioning and heat pump units consisting of separate evaporator fan and compressor-condenser components.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Field quality control reports.
- E. Operation and Maintenance Data: For split-system air conditioning units to include in emergency, operation, and maintenance manuals.
- F. Completed System Readiness Checklist provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 230800, COMMISSIONING OF HVAC SYSTEMS.

1.4 QUALITY ASSURANCE

- A. 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.
- B. ASHRAE Compliance:
 - 1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
 - 2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 4 "Outdoor Air Quality," Section 5 "Systems and Equipment," Section 6 " Procedures," and Section 7 "Construction and System Start-Up."
- C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004.

1.5 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Division 03 Section, "Cast-in-Place Concrete."

B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 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. Carrier Corporation; Home Comfort and HVAC Building & Industrial Systems.
 - 2. Daikin.
 - 3. Mitsubishi Electric & Electronics USA, Inc.; HVAC Advanced Products Division.
 - 4. SANYO North America Corporation; SANYO Fisher Company.
 - 5. Fujitsu.

2.2 INDOOR UNITS 5 TONS OR LESS

- A. Concealed Evaporator-Fan Components:
 - 1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
 - 2. Insulation: Faced, glass-fiber duct liner.
 - 3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 210/240.
 - 4. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
 - 5. Fan Motors:
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."
 - b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
 - c. Wiring Terminations: Connect motor to chassis wiring with plug connection.
 - 6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
 - 7. Filters: Permanent, cleanable.
 - 8. Condensate Drain Pans:
 - a. Fabricated with minimum one percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.
 - b. Single-wall, stainless-steel sheet.
 - c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.
- B. Wall-Mounted, Evaporator Fan Components:
 - 1. Cabinet: Enameled steel with removable panels on front and ends, and discharge drain pans with drain connection.
 - 2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 210/240.
 - 3. Fan: Direct drive, centrifugal.
 - 4. Fan Motors:

- a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 23 Section, "Common Motor Requirements for HVAC Equipment."
- b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
- c. Enclosure Type: Totally enclosed, fan cooled.
- d. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
- e. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.
- f. Mount unit-mounted disconnect switches on interior of unit.
- 5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
- 6. Condensate Drain Pans:
 - a. Fabricated with one percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends), and to direct water toward drain connection.
 - b. Single-wall, galvanized steel sheet.
 - c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on both ends of pan.
- 7. Air Filtration Section:
 - a. General Requirements for Air Filtration Section:
 - 1) Comply with NFPA 90A.
 - 2) Minimum Arrestance: According to ASHRAE 52.1 and MERV according to ASHRAE 52.2.
 - 3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.

2.3 OUTDOOR UNITS (5 TONS OR LESS)

- A. Air-Cooled, Compressor-Condenser Components:
 - 1. Casing: Steel, finished with baked enamel, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
 - 2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - Compressor Type: Scroll.
 - b. Two-speed compressor motor with manual reset high pressure switch and automatic reset low pressure switch.
 - c. Refrigerant Charge: R-410A.
 - d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 210/240.
 - 3. Heat Pump Components: Reversing valve and low temperature air cutoff thermostat.
 - 4. Fan: Aluminum propeller type, directly connected to motor.
 - 5. Motor: Permanently lubricated, with integral thermal overload protection.
 - 6. Mounting Base: Polyethylene.

2.4 ACCESSORIES

- A. Control equipment and sequence of operation are specified in Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls."
- B. Refer to equipment schedule on drawings for additional requirements.

2.5 CAPACITIES AND CHARACTERISTICS

A. Refer to equipment schedule on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install roof-mounted, compressor-condenser on equipment mounting pad. Anchor units to supports with removable, cadmium-plated fasteners.
- D. Install compressor-condenser on neoprene vibration isolation pads. See Division 23 Section, "Vibration and Seismic Controls for HVAC Piping and Equipment."
- E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Prepare test and inspection reports.

3.4 STARTUP SERVICE

- A. Perform startup service.
 - Complete installation and startup checks according to manufacturer's written instructions.
- B. The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with COR and Commissioning Agent. Provide a minimum notice of 10 working days prior to startup and testing.

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3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain units.

3.6 COMMISSIONING

- A. Provide commissioning documentation in accordance with the requirements of Section 230800, COMMISSIONING OF HVAC SYSTEMS.
- B. Components provided under this section of the specification will be tested as part of a larger system.

END OF SECTION 238126

SECTION 238219 - FAN COIL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes fan coil units and accessories.

1.3 DEFINITIONS

A. BAS: Building automation system.

1.4 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Coordination Drawings: Floor plans, reflected ceiling plans, and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Ceiling suspension components.
 - 2. Structural members to which fan coil units will be attached.
 - 3. Method of attaching hangers to building structure.
 - 4. Size and location of initial access modules for acoustical tile.
 - 5. Items penetrating finished ceiling, including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - 6. Perimeter moldings for exposed or partially exposed cabinets.
- D. Field quality control test reports.
- E. Operation and Maintenance Data: For fan coil units to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section, "Operation and Maintenance Data," include the following:
 - 1. Maintenance schedules and repair part lists for motors, coils,
- F. Completed System Readiness Checklist provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 230800, COMMISSIONING OF HVAC SYSTEMS.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 "Systems and Equipment" and Section 7 "Construction and Startup."
- C. ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 "Heating, Ventilating, and Air Conditioning."

1.6 COORDINATION

- A. Coordinate layout and installation of fan coil units and suspension system components with other construction that penetrates or is supported by ceilings, including light fixtures, HVAC equipment, fire-suppression system components, and partition assemblies.
- B. Coordinate size and location of wall sleeves for outdoor-air intake.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fan-Coil-Unit Filters: Furnish one set of spare filters for each filter installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
- B. In the Fan-Coil-Unit Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 - 3. Basis of Design Product: The design for each fan coil unit is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 DUCTED FAN-COIL UNITS

- A. Available Manufacturers:
 - 1. Daikin Applied.
 - 2. Trane.
 - 3. Environmental Technologies, Inc.
 - Johnson Controls Inc.
- B. Description: Factory-packaged and -tested units rated according to ARI 440, ASHRAE 33, and UL 1995.
- C. Coil Section Insulation: 1/2-inch thick, matte finish, closed-cell foam complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.

- 1. Fire Hazard Classification: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
- 2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
- D. Drain Pans: Fabricate pans and drain connections to comply with ASHRAE 62.1-2004.
- E. Chassis: Galvanized steel where exposed to moisture, with baked enamel finish and removable access panels.
- F. Cabinets: Steel with baked enamel finish in manufacturer's standard paint color.
 - 1. Supply-Air Plenum: Sheet metal plenum finished and insulated to match the chassis.
 - 2. Return-Air Plenum: Sheet metal plenum finished to match the chassis.
 - 3. Mixing Plenum: Sheet metal plenum finished and insulated to match the chassis with outdoor- and return-air, formed steel dampers.
 - 4. Dampers: Galvanized steel with extruded-vinyl blade seals, flexible metal jamb seals, and interlocking linkage.
- G. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
- H. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F. Include manual air vent and drain.
- I. Direct-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, multispeed motor resiliently mounted in the fan inlet. Aluminum or painted steel wheels, and painted steel or galvanized steel fan scrolls. Motors shall be electronically commutated with start/stop relays and unit mounted three-speed switch.
- J. Control devices and operational sequence are specified in Division 23 Section, "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls."
- K. Electrical Connection: Factory wire motors and controls for a single electrical connection.
- L. Capacities and Characteristics:
 - 1. Refer to schedules on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive fan coil units for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in for piping and electrical connections to verify actual locations before fan coil-unit installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install fan coil units level and plumb.
- B. Install fan coil units to comply with NFPA 90A.
- C. Suspend fan coil units from structure with spring type vibration isolators. Vibration isolators are specified in Division 23 Section, "Vibration and Seismic Controls for HVAC Piping and Equipment."
- D. Install new filters in each fan coil unit within two weeks after Substantial Completion.

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3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:
 - 1. Install piping adjacent to machine to allow service and maintenance.
 - 2. Connect condensate drain to indirect waste.
 - a. Install condensate trap of adequate depth to seal against the pressure of fan. Install cleanouts in piping at changes of direction.
- B. Connect supply and return ducts to fan coil units with flexible duct connectors specified in Division 23 Section, "Air Duct Accessories." Comply with safety requirements in UL 1995 for duct connections.
- C. Ground equipment according to Division 26 Section, "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Division 26 Section, "Low Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
 - 3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
- B. Remove and replace malfunctioning units and retest as specified above.

3.5 STARTUP SERVICE

- A. Perform startup service.
 - Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Verify that inlet duct connections are as recommended by manufacturer to achieve proper performance.
 - 3. Verify that controls and control enclosure are accessible.
 - 4. Verify that control connections are complete.
 - 5. Verify that nameplate and identification tag are visible.
 - 6. Verify that controls respond to inputs as specified.
- B. The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with COR and Commissioning Agent. Provide a minimum notice of 10 working days prior to startup and testing.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fan coil units. Refer to Division 01 Section, "Demonstration and Training."

3.7 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of Section 230800, COMMISSIONING OF HVAC SYSTEMS.

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B. Components provided under this section of the specification will be tested as part of a larger system.

END OF SECTION 238219

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SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Electrical equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Sleeve seals.
 - 4. Grout.
 - 5. Common electrical installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For sleeve seals.

1.5 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-inplace concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section, "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section, "Penetration Firestopping".

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
 - 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable
 - 3. Pressure Plates: Carbon steel. Include two for each sealing element.
 - 4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 6 inches above finished floor level.
- G. Size pipe sleeves to provide [1/4-inch] annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section, "Joint Sealants.".
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section, "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Underground, Exterior-Wall Penetrations: Install cast iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly.

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Firestopping materials and installation requirements are specified in Division 07 Section, "Penetration Firestopping."

SECTION 260519 - LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
 - 3. Sleeves and sleeve seals for cables.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.
- C. Home run: Branch circuit wiring extended from the source of power to either the first electrical device or to a central location of the associated circuit and acts as a distribution point to the devices indicated to be powered by the source.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.
- C. Field quality control test reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.6 COORDINATION

A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alcan Products Corporation; Alcan Cable Division.
 - 2. American Insulated Wire Corp.; a Leviton Company.
 - 3. General Cable Corporation.
 - 4. Senator Wire & Cable Company.
 - 5. Southwire Company.
- C. Copper Conductors: Comply with NEMA WC 70.
- D. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.
- E. Multiconductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC with ground wire.

2.2 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M; Electrical Products Division.
 - 5. Tyco Electronics Corp.
- C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SLEEVES FOR CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch thickness as indicated and of length to suit application.
- C. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section, "Penetration Firestopping."

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- D. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-THWN, single conductors in raceway.
- E. Branch Circuits Concealed in Ceilings, Walls, and Partitions:
 - 1. Home run: Type THHN-THWN. Single conductors in raceway.
 - 2. Between devices wired to same source branch circuit: Type THHN-THWN. Single Conductors in raceway.
- F. Branch conductor above accessible ceilings:
 - 1. Home Run: Type THHN-THWN. Single conductors in raceway.
 - 2. Between devices wired to same source branch circuit: Type THHN-THWN. Metal-clad cable, Type MC.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section, "Hangers and Supports for Electrical Systems."
- F. Identify and color code conductors and cables according to Division 26 Section, "Identification for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Delete subparagraph below unless aluminum conductors are specified.
- D. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections and prepare test reports.
- C. Tests and Inspections:

- After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
- 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- 3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- D. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- E. Remove and replace malfunctioning units and retest as specified above.

SECTION 260526 -GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Grounding systems and equipment.

1.3 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. 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.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 4. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 6 by 24 inches, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 24 inches below grade.
- C. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus on insulated spacers 2 inches minimum from wall, 84 inches above finished floor unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down to specified height above floor; connect to horizontal bus.
- D. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.
 - 7. Armored and metal-clad cable runs.
 - 8. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- D. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

E. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- C. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lugtype connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- D. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

3.4 LABELING

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.

3.5 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal. Make tests at ground rods before any conductors are connected.

- a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
- b. Perform tests by fall-of-potential method according to IEEE 81.
- B. Grounding system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.
- D. Report measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 - 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
 - 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
- E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
- B. Related Sections include the following:
 - 1. Division 26 Section "Vibration and Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Equipment supports.

1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. Thomas & Betts Corporation.
 - e. Unistrut; Tyco International, Ltd.
 - 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 5. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 - 2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 - 3. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - 4. Toggle Bolts: All-steel springhead type.
 - 5. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as

used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

- 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
 - 1. Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. EPDM: Ethylene-propylene-diene terpolymer rubber.
- D. FMC: Flexible metal conduit.
- E. IMC: Intermediate metal conduit.
- F. LFMC: Liquidtight flexible metal conduit.
- G. LFNC: Liquidtight flexible nonmetallic conduit.
- H. NBR: Acrylonitrile-butadiene rubber.
- I. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 3. O-Z Gedney; a unit of General Signal.
 - 4. Wheatland Tube Company.
- B. Rigid Steel Conduit: ANSI C80.1.

- C. IMC: ANSI C80.6.
- D. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch, minimum.
- E. EMT: ANSI C80.3.
- F. FMC: Zinc-coated steel.
- G. LFMC: Flexible steel conduit with PVC jacket.
- H. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
 - 2. Fittings for EMT: Steel, set-screw type.
 - 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.
- I. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUIT AND TUBING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. CANTEX Inc.
 - 3. Lamson & Sessions; Carlon Electrical Products.
 - 4. RACO; a Hubbell Company.
 - 5. Thomas & Betts Corporation.
- C. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.

2.3 METAL WIREWAYS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman.
 - 3. Square D; Schneider Electric.
- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type.
- E. Finish: Manufacturer's standard enamel finish.

2.4 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Thomas & Betts Corporation.
 - b. Walker Systems, Inc.; Wiremold Company (The).
 - c. Wiremold Company (The); Electrical Sales Division.
- B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hubbell Incorporated; Wiring Device-Kellems Division.
 - b. Lamson & Sessions; Carlon Electrical Products.
 - c. Panduit Corp.
 - d. Walker Systems, Inc.; Wiremold Company (The).
 - e. Wiremold Company (The); Electrical Sales Division.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. Erickson Electrical Equipment Company.
 - 3. Hoffman.
 - 4. O-Z/Gedney; a unit of General Signal.
 - 5. RACO; a Hubbell Company.
 - 6. Thomas & Betts Corporation.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
 - 1. Exposed Conduit: Rigid steel conduit.
 - 2. Concealed Conduit, Aboveground: EMT.
 - 3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.

- 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
- 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Comply with the following indoor applications, unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT.
 - 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 - 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 5. Damp or Wet Locations: Rigid steel conduit.
 - 6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 - PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.

3.2 INSTALLATION

- A. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- B. Complete raceway installation before starting conductor installation.
- C. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- D. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- F. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- G. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- H. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- I. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- J. Flexible Conduit Connections: Use maximum of 48 inches of flexible conduit for recessed and semi recessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC in damp or wet locations not subject to severe physical damage.

K. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
 - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
 - 2. Install backfill as specified in Division 31 Section "Earth Moving." After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
 - 3. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
 - 4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
 - b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
 - 5. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits, placing them 24 inches o.c. Align planks along the width and along the centerline of conduit.

3.4 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Warning labels and signs.
 - 6. Equipment identification labels.
 - 7. Miscellaneous identification products.

1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.4 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.

- 2. Legend: Indicate voltage.
- C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.2 METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Colors for Raceways Carrying Circuits at 600 V and Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage.
- C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.4 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
 - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
 - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE,..
 - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

2.5 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.

3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A, and 120V to ground: Identify with self-adhesive vinyl label. Install labels at 30-foot maximum intervals.
- B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. Emergency Power.
 - 2. Power.
- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
 - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.
 - a. Color shall be factory applied for conductors up to No. 8 AWG, and field applied for conductors larger than No. 8 AWG.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Colors for 480/277 V circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.

- D. Install instructional sign including the color code for grounded and ungrounded conductors using adhesive-film-type labels.
- E. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- F. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
 - 1. Limit use of underground-line warning tape to direct-buried cables.
 - 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- G. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- H. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- I. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:
 - a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
 - 2. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Enclosed switches.
 - e. Contactors.

SECTION 260800 - COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. The requirements of this Section apply to all sections of Division 26.
- B. This project will have selected building HVAC systems commissioned. The complete list of equipment and systems to be commissioned is specified in Section 230800 "Commissioning of HVAC". A Commissioning Agent (CxA) appointed by and working directly for The School District will manage the commissioning process.

1.2 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Division 23 "Commissioning of HVAC".

1.3 SUMMARY

A. This Section includes requirements for commissioning all emergency and exit lighting, lighting control systems and general power systems and facility electrical systems, as they relate to the HVAC systems being commissioned.

1.4 DEFINITIONS

- A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- B. CxA: Commissioning Authority.
- C. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.
- D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.5 CONTRACTOR'S RESPONSIBILITIES

- A. Provide all labor, instrumentation, tools, and equipment costs for technicians for the performance of commissioning testing.
- B. Perform commissioning tests at the direction of the CxA.
- C. Attend construction phase coordination meetings.
- D. Provide information requested by the CxA for final commissioning documentation.
- E. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.6 CxA'S RESPONSIBILITIES

- A. Provide Project-specific construction checklists and commissioning process test procedures for all HVAC&R systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.
- B. Direct commissioning testing.

- C. Provide test data, inspection reports, and certificates in Systems Manual.
- D. The CxA will be appointed by and work directly for The School District.

1.7 COMMISSIONING DOCUMENTATION

- A. Provide the following information to the CxA for inclusion in the commissioning plan:
 - 1. Process and schedule for completing construction checklists for emergency and exit lighting equipment, wiring and components to be verified and tested.
 - 2. Process and schedule for completing construction checklists for lighting controls equipment, wiring and components to be verified and tested.
 - 3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC&R systems, assemblies, equipment, and components to be verified and tested.
 - 4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
 - 5. Certificate of readiness certifying that HVAC&R systems, subsystems, equipment, and associated controls are ready for testing.
 - 6. Test and inspection reports and certificates.
 - 7. Corrective action documents.

1.8 SUBMITTALS

- A. Certificates of readiness.
- B. Certificates of completion of installation, prestart, and startup activities.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL TESTING REQUIREMENTS

- A. Provide technicians, instrumentation, and tools to perform commissioning tests at the direction of the CxA.
- B. The CxA shall prepare detailed testing plans, procedures, and checklists for all systems to be commissioned as part of this project.

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following lighting control devices:
 - Indoor occupancy and vacancy sensors.
 - 2. Daylight-Harvesting Dimming Controls, Digital
 - 3. Conductors and Cables
 - 4. Switchbox-Mounted Motion Sensors
 - 5. Electronic Time Switches
- B. Related Sections include the following:
 - 1. Division 26 Section, "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.3 DEFINITIONS

- A. LED: Light-emitting diode.
- B. PIR: Passive infrared.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show installation details for occupancy and light-level sensors.
 - Interconnection diagrams showing wiring for each system detailed in the 'Lighting Control Room Schedule'.
 - 2. Device submittals shall be organized by 'Note Number' in 'Lighting Control Room Schedule'.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 COORDINATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 INDOOR OCCUPANCY AND VACANCY SENSORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

- 1. Hubbell Lighting
- 2. Steinel Lighting Controls
- 3. Leviton Mfg. Company Inc.
- 4. Sensor Switch, Inc.
- B. General Description:
 - 1. Wall or ceiling mounted, solid-state indoor occupancy and vacancy sensors.
 - 2. Passive infrared (PIR), ultrasonic, or dual technology. Refer to drawings for specification.
 - 3. Separate power pack
 - 4. Hardwired connection to power pack
 - 5. Operation:
 - a. Vacancy Mode (Manual on/Automatic off): Turn lights on via local manual switch and off when space is unoccupied; with a time delay for turning lights off, adjustable over a maximum range of 1 to 20 minutes.
 - b. Occupancy Mode (Automatic on/Automatic off): When local switch is close, turned lights on when space is occupied and off when space is unoccupied; with a time delay for turning lights off, adjustable over a maximum range of 1 to 20 minutes.
 - 6. Sensor Output: Sensor is powered from the power pack.
 - 7. Power pack: Contacts rate for 20A LED load at 120 and 277 V(ac). Sensor has 24 V(dc) Class 2 power source.
 - 8. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 3/4-inch knockout in a standard electrical enclosure.
 - 9. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
 - 10. Bypass Switch: Override the on function in case of sensor failure.
 - 11. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; keep lighting off when selected lighting level is present.
- C. PIR Type: Wall or ceiling mounted; detect occupants in coverage area by their heat and movement.
 - 1. Detector sensitivity: Detect occurrences of 6 inch minimum movement of any portion of a human body that presents a target of not less than 36 sq. inch.
- D. Ultrasonic Type: Wall or ceiling mounted; detect occupants in coverage area through pattern changes of reflected ultrasonic energy.
 - 1. Detector Sensitivity: Detect a person of average size and weight moving not less than 12 inch in either a horizontal or a vertical manner at an approximate speed of 12 inch/s.
- E. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on-off functions shall be selectable in the field by operating controls on unit.
 - 1. Sensitivity Adjustment: Separate for each sensing technology.
 - 2. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.

2.2 DAYLIGHT-HARVESTING DIMMING CONTROLS, DIGITAL

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Steinel Lighting Controls
 - 2. Hubbell Lighting
 - 3. Leviton Mfg. Company Inc.
 - 4. Sensor Switch Inc.
- B. Description: Sensing daylight and electrical lighting levels, the system adjusts the indoor electrical lighting levels. As daylight increases, lights are dimmed.
 - 1. Lighting control set point is based on the following two lighting conditions:
 - a. When no daylight is present (target level).
 - b. When significant daylight is present.
 - System programming is done with hand-held, initial setup remote-control tool.
- C. Ceiling-Mounted Dimming Controls: Solid-state, light-level sensor unit, with separate powerpack, to detect changes in indoor lighting levels that are perceived by the eye.
- D. Power Pack: Digital controller capable of accepting multiple input with three outputs rated for 20A loads at 120 and 277V (ac). Sensor has 24V(dc) Class 2 power source.

2.3 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section, "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Division 26 Section, "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Division 26 Section, "Low-Voltage Electrical Power Conductors and Cables."

2.4 SWITCHBOX-MOUNTED MOTION SENSORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Steinel Lighting Controls
 - 2. Hubbell Lighting
 - 3. Leviton Mfg. Company Inc.
 - 4. Sensor Switch, Inc.
- B. General Requirements for Sensors: Automatic wall switch motion sensor with manual on-off switch, suitable for mounting in a single hang switchbox using hardwired connection.
- C. Operation:
 - a. Vacancy Mode (Manual on/Automatic off): Turn lights on via local manual switch and off when space is unoccupied; with a time delay for turning lights off, adjustable over a maximum range of 1 to 20 minutes.
 - b. Occupancy Mode (Automatic on/Automatic off): When local switch is close, turned lights on when space is occupied and off when space is unoccupied; with a time delay for turning lights off, adjustable over a maximum range of 1 to 20 minutes.

2.5 ELECTRONIC TIME SWITCHES

- A. Manufacturers: Subject to complance with requirements, provide products by one of the following:
 - 1. Intermatic, Inc.
 - 2. Lithonia Lighting
 - 3. Square D; Schneider Electric
 - 4. TORK
- B. Electronic time switches: Solid state, programmable, with alphanumeric display; complying with UL 917.
- C. Program: Two on-off set points on a 24-hour schedule, allowing different set points for each day of the week and an annual holiday schedule that overrides the weekly operation on holidays.
- D. Circuitry: Allow connection of photoelectric relay as substitute for on-off function of a program.
- E. Astronomic Time: All channels

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 WIRING INSTALLATION

- A. Wiring Method: Comply with Division 26 Section, "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size shall be 3/4 inch.
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.3 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section, "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaries controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
 - 2. Operational Test: Verify operation of each lighting control device, and adjust time delays.
- B. Lighting control devices that fail tests and inspections are defective work.

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3.5 ADJUSTING

A. Motion Sensor and Daylight Sensor Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.6 DEMONSTRATION

- A. Coordinate demonstration of products specified in this Section.
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices. Refer to Division 01 Section, "Demonstration and Training."

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Distribution panelboards.
 - 2. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

- A. SVR: Suppressed voltage rating.
- B. TVSS: Transient voltage surge suppressor.

1.4 SUBMITTALS

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
- C. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section, "Operation and Maintenance Data," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NEMA PB 1.
- F. Comply with NFPA 70.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.
- B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations:
 - 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.

1.8 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

1.10 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Keys: Two spares for each type of panelboard cabinet lock.
 - 2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: Two spares for each panelboard.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Division 26 Section, "Vibration and Seismic Controls for Electrical Systems."
- B. Enclosures: Flush and Surface-mounted cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R.
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

- 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
- 4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
- 5. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel
- 6. Finishes:
 - a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Galvanized steel.
 - c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.
- 7. Directory Card: Inside panelboard door, mounted in transparent card holder.
- C. Incoming Mains Location: Coordinated with field installation requirements.
- D. Phase, Neutral, and Ground Buses:
 - 1. Material: Tin-plated aluminum.
 - 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
- E. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Tin-plated aluminum.
 - 2. Main and Neutral Lugs: Mechanical type.
 - 3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
- F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- G. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, listed and labeled for series-connected short-circuit rating by an NRTL.
- H. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 DISTRIBUTION PANELBOARDS

- 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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Panelboards: NEMA PB 1, power and feeder distribution type.
- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
 - 1. For doors more than 36 inches high, provide two latches, keyed alike.
- D. Mains: As indicated on the drawings.
- E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

- G. Branch Overcurrent Protective Devices: Fused switches.
- H. Contactors in Main Bus: NEMA ICS 2, Class A, mechanically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
 - 1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
 - 2. External Control-Power Source: 120-V branch circuit.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- 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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: As indicated on the drawings
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Contactors in Main Bus: NEMA ICS 2, Class A, mechanically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
 - 1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
 - 2. External Control-Power Source: 120-V branch circuit.
- F. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
- G. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- 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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Some manufacturers offer shunt-trip operators for their fused switches; however, most do not recommend using this feature for providing ground-fault protection on switches rated 1000 A and above in panelboards; they recommend using MCCBs or switches specified in Division 26 Section "Switchboards." Consult manufacturers for availability and limitations if this feature is required.
- C. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
 - 1. Fuses, and Spare-Fuse Cabinet: Comply with requirements specified in Division 26 Section, "Fuses."
 - 2. Fused Switch Features and Accessories: Standard ampere ratings and number of poles.

2.5 ACCESSORY COMPONENTS AND FEATURES

- A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
- B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- C. Comply with mounting and anchoring requirements specified in Division 26 Section, "Vibration and Seismic Controls for Electrical Systems."
- D. Mount with highest circuit breaker a maximum of 6'6" above finished floor unless otherwise indicated on the drawings.
- E. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box
- F. Install overcurrent protective devices and controllers not already factory installed.1. Set field-adjustable, circuit-breaker trip ranges.
- G. Install filler plates in unused spaces.
- H. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
- I. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.
- J. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section, "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

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- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section, "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section, "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
 - c. Instruments and Equipment:
 - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- D. Panelboards will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.
- B. Circuit changes made during load balancing may negate color-coding of phases and circuits. If load balancing proves undesirable or is to be performed by others, delete paragraph below.
- C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.
 - 1. Measure as directed during period of normal system loading.

- 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
- 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
- 4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.6 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Twist-locking receptacles.
 - 3. Wall-box motion sensors.
 - 4. Snap switches.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.6 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 - 1. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 STRAIGHT BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

2.3 GFCI RECEPTACLES

A. General Description: Straight blade. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

2.4 TWIST-LOCKING RECEPTACLES

A. Single Convenience Receptacles: Comply with NEMA WD 1, NEMA WD 6 configuration as indicated on the drawings, and UL 498.

2.5 SNAP SWITCHES

- Comply with NEMA WD 1 and UL 20.
- B. Switches, 120/277 V, 20 A:

2.6 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: Cold-rolled steel.
 - 3. Material for Unfinished Spaces: Galvanized steel.
 - 4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in "wet locations."
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum with lockable cover.

2.7 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
 - 1. Wiring Devices Connected to Normal Power System: As selected by Architect, unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. NECA 1 referenced in paragraph below includes device mounting-height requirements. See "Product Selection and Application Considerations" Article in the Evaluations for device mounting heights in that standard.
- B. Coordination with Other Trades:
 - 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

- 1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
- 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
- 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
- 4. Existing Conductors:
- a. Cut back and pigtail, or replace all damaged conductors.
- b. Straighten conductors that remain and remove corrosion and foreign matter.
- c. Pigtailing existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

- Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
- 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
- 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
- 4. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
- 5. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
- 6. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
- 7. Tighten unused terminal screws on the device.
- 8. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

- E. Receptacle Orientation:
 - 1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 IDENTIFICATION

- Comply with Division 26 Section "Identification for Electrical Systems."
 - 1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

- A. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Enclosures.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.4 SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
- 4. Include evidence of NRTL listing for series rating of installed devices.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
- B. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

- Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
- B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 - 1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of electric service.
 - 2. Indicate method of providing temporary electric service.
 - 3. Do not proceed with interruption of electric service without Owner's written permission.
 - 4. Comply with NFPA 70E.

1.7 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

- 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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - 4. Lugs: Mechanical type, suitable for number, size, and conductor material.
 - 5. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

- 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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.

- 4. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Hookstick Handle: Allows use of a hookstick to operate the handle.
 - 4. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.3 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 - 2. Outdoor Locations: NEMA 250, Type 3R.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install fuses in fusible devices.
- D. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

- A. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- B. Tests and Inspections:

- 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- 3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

SECTION 262923 - VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes separately enclosed, pre-assembled, combination VFCs, rated 600 V and less, for speed control of three-phase, squirrel-cage induction motors.

1.3 DEFINITIONS

- A. BAS: Building automation system.
- B. CE: Conformite Europeene (European Compliance).
- C. CPT: Control power transformer.
- D. EMI: Electromagnetic interference.
- E. IGBT: Insulated-gate bipolar transistor.
- F. LAN: Local area network.
- G. LED: Light-emitting diode.
- H. MCP: Motor-circuit protector.
- I. NC: Normally closed.
- J. NO: Normally open.
- K. OCPD: Overcurrent protective device.
- L. PCC: Point of common coupling.
- M. PID: Control action, proportional plus integral plus derivative.
- N. PWM: Pulse-width modulated.
- O. RFI: Radio-frequency interference.
- P. TDD: Total demand (harmonic current) distortion.
- Q. THD(V): Total harmonic voltage demand.
- R. VFC: Variable-frequency motor controller.

1.4 SUBMITTALS

- A. Product Data: For each type and rating of VFC indicated. Include features, performance, electrical ratings, operating characteristics, shipping and operating weights, and furnished specialties and accessories.
- B. Shop Drawings: For each VFC indicated. Include dimensioned plans, elevations, and sections; and conduit entry locations and sizes, mounting arrangements, and details, including required clearances and service space around equipment.
 - 1. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Each installed unit's type and details.
 - b. Factory-installed devices.
 - c. Enclosure types and details.
 - d. Nameplate legends.
 - e. Short-circuit current (withstand) rating of enclosed unit.

- f. Features, characteristics, ratings, and factory settings of each VFC and installed devices.
- g. Specified modifications.
- 2. Schematic and Connection Wiring Diagrams: For power, signal, and control wiring.
- C. Product Certificates: For each VFC, from manufacturer.
- D. Field quality-control reports.
 - 1. Manufacturer's written instructions for testing and adjusting thermal-magnetic circuit breaker and MCP trip settings.
 - 2. Manufacturer's written instructions for setting field-adjustable overload relays.
 - 3. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
 - 4. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.
- E. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate, full-load currents.
- F. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that switch settings for motor-running overload protection suit actual motors to be protected.

1.5 QUALITY ASSURANCE

- A. 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.
- B. Comply with NFPA 70.
- C. IEEE Compliance: Fabricate and test VFC according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

1.6 DELIVERY, STORAGE, AND HANDLING

A. If stored in space that is not permanently enclosed and air conditioned, remove loose packing and flammable materials from inside controllers and connect factory-installed space heaters to temporary electrical service.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation, capable of driving full load without derating, under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than 14 deg F and not exceeding 104 deg F.
 - 2. Ambient Storage Temperature: Not less than minus $4 \deg F$ and not exceeding $140 \deg F$
 - 3. Humidity: Less than 95 percent (noncondensing).
 - 4. Altitude: Not exceeding 3300 feet (1005 m).
- B. Interruption of Existing Electrical Systems: Do not interrupt electrical systems in facilities occupied by Owner or others unless permitted under the following

conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

- 1. Notify Owner no fewer than two days in advance of proposed interruption of electrical systems.
- 2. Indicate method of providing temporary electrical service.
- 3. Do not proceed with interruption of electrical systems without Owner's written permission.
- 4. Comply with NFPA 70E.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for VFCs, including clearances between VFCs, and adjacent surfaces and other items.

1.8 COORDINATION

- A. Coordinate features of motors, load characteristics, installed units, and accessory devices to be compatible with the following:
 - 1. Torque, speed, and horsepower requirements of the load.
 - 2. Ratings and characteristics of supply circuit and required control sequence.
 - 3. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [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] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
 - 1. ABB.
 - 2. Danfoss Inc.; Danfoss Drives Div.
 - 3. Square D; a brand of Schneider Electric.
 - 4. Toshiba International Corporation.
 - 5. Yaskawa Electric America, Inc; Drives Division.
- C. General Requirements for VFCs: Comply with NEMA ICS 7, NEMA ICS 61800-2, and UL 508C.
- D. Application: Constant torque and variable torque.
- E. VFC Description: Variable-frequency power converter (rectifier, dc bus, and IGBT, PWM inverter) factory packaged in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged to provide self-protection, protection, and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency.
 - Units suitable for operation of NEMA MG 1, Design A and Design B motors as defined by NEMA MG 1, Section IV, Part 30, "Application Considerations for Constant Speed Motors Used on a Sinusoidal Bus with Harmonic Content and General Purpose Motors Used with Adjustable-Voltage or Adjustable-Frequency Controls or Both."

- 2. Units suitable for operation of inverter-duty motors as defined by NEMA MG 1, Section IV, Part 31, "Definite-Purpose Inverter-Fed Polyphase Motors."
- 3. Listed and labeled for integrated short-circuit current (withstand) rating by an NRTL acceptable to authorities having jurisdiction.
- F. Design and Rating: Match load type, such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.
- G. Output Rating: Three-phase; 10 to 60 Hz, with voltage proportional to frequency throughout voltage range; maximum voltage equals input voltage.
- H. Unit Operating Requirements:
 - 1. Input AC Voltage Tolerance: Plus 10 and minus 10 percent of VFC input voltage rating.
 - 2. Input AC Voltage Unbalance: Not exceeding 3 percent.
 - 3. Input Frequency Tolerance: Plus or minus 3 percent of VFC frequency rating.
 - 4. Minimum Efficiency: 96 percent at 60 Hz, full load.
 - 5. Minimum Displacement Primary-Side Power Factor: 96 percent under any load or speed condition.
 - 6. Minimum Short-Circuit Current (Withstand) Rating: 10 kA.
 - 7. Vibration Withstand: Comply with IEC 60068-2-6.
 - 8. Overload Capability: 1.1 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.
 - 9. Starting Torque: Minimum 100 percent of rated torque from 3 to 60 Hz.
 - 10. Speed Regulation: Plus or minus 5 percent.
 - 11. Output Carrier Frequency: Selectable; 0.5 to 15 kHz.
 - 12. Stop Modes: Programmable; includes fast, free-wheel, and dc injection braking.
- I. Inverter Logic: Microprocessor based, 32 bit, isolated from all power circuits.
- J. Isolated Control Interface: Allows VFCs to follow remote-control signal over a minimum 40:1 speed range.
 - 1. Signal: Electrical.
- K. Internal Adjustability Capabilities:
 - 1. Minimum Speed: 5 to 25 percent of maximum rpm.
 - 2. Maximum Speed: 80 to 100 percent of maximum rpm.
 - 3. Acceleration: 0.1 to 999.9 seconds.
 - 4. Deceleration: 0.1 to 999.9 seconds.
 - 5. Current Limit: 30 to minimum of 150 percent of maximum rating.
- L. Self-Protection and Reliability Features:
 - Input transient protection by means of surge suppressors to provide threephase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.
 - 2. Loss of Input Signal Protection: Selectable response strategy, including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm.
 - 3. Under- and overvoltage trips.
 - 4. Inverter overcurrent trips.

- 5. VFC and Motor Overload/Overtemperature Protection: Microprocessor-based thermal protection system for monitoring VFCs and motor thermal characteristics, and for providing VFC overtemperature and motor overload alarm and trip; settings selectable via the keypad; NRTL approved.
- 6. Critical frequency rejection, with three selectable, adjustable deadbands.
- 7. Instantaneous line-to-line and line-to-ground overcurrent trips.
- 8. Loss-of-phase protection.
- 9. Reverse-phase protection.
- 10. Short-circuit protection.
- 11. Motor overtemperature fault.
- M. Automatic Reset/Restart: Attempt three restarts after drive fault or on return of power after an interruption and before shutting down for manual reset or fault correction; adjustable delay time between restart attempts.
- N. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped, unless "Bidirectional Autospeed Search" feature is available and engaged.
- O. Bidirectional Autospeed Search: Capable of starting VFC into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to drive, motor, or load.
- P. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.
- Q. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fanventilated motors at slow speeds.
- R. Integral Input Disconnecting Means and OCPD: NEMA AB 1, instantaneous-trip circuit breaker with pad-lockable, door-mounted handle mechanism.
 - 1. Disconnect Rating: Not less than 115 percent of VFC input current rating.
 - 2. Disconnect Rating: Not less than 115 percent of NFPA 70 motor full-load current rating or VFC input current rating, whichever is larger.
 - 3. Auxiliary Contacts: NO/NC, arranged to activate before switch blades open.
 - 4. Auxiliary contacts "a" and "b" arranged to activate with circuit-breaker handle.
 - 5. NC alarm contact that operates only when circuit breaker has tripped.

2.2 CONTROLS AND INDICATION

- A. Status Lights: Door-mounted LED indicators displaying the following conditions:
 - 1. Power on.
 - 2. Run.
 - 3. Overvoltage.
 - 4. Line fault.
 - 5. Overcurrent.
 - 6. External fault.
- B. Panel-Mounted Operator Station: Manufacturer's standard front-accessible, sealed keypad and plain-English language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.
 - 1. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.

- 2. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: View only; view and operate; and view, operate, and service.
 - a. Control Authority: Supports at least four conditions: Off, local manual control at VFC, local automatic control at VFC, and automatic control through a remote source.
- C. Historical Logging Information and Displays:
 - 1. Real-time clock with current time and date.
 - 2. Running log of total power versus time.
 - 3. Total run time.
 - 4. Fault log, maintaining last four faults with time and date stamp for each.
- D. Indicating Devices: Digital display and additional readout devices as required, mounted flush in VFC door and connected to display VFC parameters including, but not limited to:
 - 1. Output frequency (Hz).
 - 2. Motor speed (rpm).
 - 3. Motor status (running, stop, fault).
 - 4. Motor current (amperes).
 - 5. Motor torque (percent).
 - 6. Fault or alarming status (code).
 - 7. PID feedback signal (percent).
 - 8. DC-link voltage (V dc).
 - 9. Set point frequency (Hz).
 - 10. Motor output voltage (V ac).
- E. Control Signal Interfaces:
 - 1. Electric Input Signal Interface:
 - a. Coordinate number of programmable analog inputs/outputs with control contractor, refer to points list on mechanical drawings: 4- to 20-mA dc. Provide additional contacts as required.
 - b. Coordinate number of multifunction programmable digital inputs/outputs with control contractor, refer to points list on mechanical drawings. Provide additional contacts as required.
 - 2. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the BAS or other control systems:
 - a. 4- to 20-mA dc.
 - 3. Output Signal Interface: A minimum of one programmable analog output signal(s) 4- to 20-mA dc, which can be configured for any of the following:
 - a. Output frequency (Hz).
 - b. Output current (load).
 - c. DC-link voltage (V dc).
 - d. Motor torque (percent).
 - e. Motor speed (rpm).
 - f. Set point frequency (Hz).
 - 4. Remote Indication Interface: A minimum of two programmable dry-circuit relay outputs (120-V ac, 1 A) for remote indication of the following:
 - a. Motor running.
 - b. Set point speed reached.
 - c. Fault and warning indication (overtemperature or overcurrent).

- d. PID high- or low-speed limits reached.
- F. PID Control Interface: Provides closed-loop set point, differential feedback control in response to dual feedback signals. Allows for closed-loop control of fans and pumps for pressure, flow, or temperature regulation.
- G. BAS Interface: Factory-installed hardware and software to enable the BAS to monitor, control, and display VFC status and alarms. Allows VFC to be used with an external system within a multidrop LAN configuration; settings retained within VFC's nonvolatile memory.

2.3 BYPASS SYSTEMS

- A. Bypass Operation: Safely transfers motor between power converter output and bypass circuit, manually, automatically, or both. Selector switches set modes and indicator lights indicate mode selected. Unit is capable of stable operation (starting, stopping, and running) with motor completely disconnected from power converter.
- B. Bypass Mode: Manual operation only; requires local operator selection at VFC. Transfer between power converter and bypass contactor and retransfer shall only be allowed with the motor at zero speed.
- C. Bypass Mode: Field-selectable automatic or manual, allows local and remote transfer between power converter and bypass contactor and retransfer, either via manual operator interface or automatic control system feedback.
- D. First option in "Bypass Contactor Configuration" Paragraph below is for full-voltage starting; second option is for reduced-voltage starting. For large horsepower motors, consider using a reduced-voltage bypass controller instead of a full-voltage controller. Some listed manufacturers also offer reduced-voltage, solid-state controllers as a bypass option; consult manufacturers if this is a preference. See "Reduced-Voltage Bypass Contactors" Article in the Evaluations for additional information.
- E. Bypass Contactor Configuration: Full-voltage (across-the-line) type.
 - 1. NORMAL/BYPASS selector switch.
 - 2. HAND/OFF/AUTO selector switch.
 - 3. NORMAL/TEST Selector Switch: Allows testing and adjusting of VFC while the motor is running in the bypass mode.
 - 4. Contactor Coils: Pressure-encapsulated type.
 - a. Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.
 - b. Power Contacts: Totally enclosed, double break, and silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
 - 5. Control Circuits: 120-V ac; obtained from integral CPT, with primary and secondary fuses, with CPT of sufficient capacity to operate all integral devices and remotely located pilot, indicating, and control devices.
 - a. CPT Spare Capacity: 100 VA.
 - 6. Overload Relays: NEMA ICS 2.
 - a. Melting-Alloy Overload Relays:
 - 1) Inverse-time-current characteristic.
 - 2) Class 10 tripping characteristic.

- 3) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
- b. Bimetallic Overload Relays:
 - 1) Inverse-time-current characteristic.
 - 2) Class 10 tripping characteristic.
 - 3) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - 4) Ambient compensated.
 - 5) Automatic resetting.
- c. Solid-State Overload Relays:
 - 1) Switch or dial selectable for motor-running overload protection.
 - 2) Sensors in each phase.
 - 3) Class 10 tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
 - 4) Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
 - 5) Analog communication module.
- d. NC isolated overload alarm contact.
- e. External overload reset push button.

2.4 ENCLOSURES

- A. VFC Enclosures: NEMA 250, to comply with environmental conditions at installed location.
 - 1. Dry and Clean Indoor Locations: Type 1.

2.5 SOURCE QUALITY CONTROL

- A. Testing: Test and inspect VFCs according to requirements in NEMA ICS 61800-2.
 - 1. Test each VFC while connected to a motor that is comparable to that for which the VFC is rated.
 - 2. Verification of Performance: Rate VFCs according to operation of functions and features specified.
- B. VFCs will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, surfaces, and substrates to receive VFCs, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance.
- B. Examine VFC before installation. Reject VFCs that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFC installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Wall-Mounting Controllers: Install VFCs on walls with tops at uniform height and with disconnect operating handles not higher than 79 inches above finished floor unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Division 26 Section "Hangers and Supports for Electrical Systems."
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install fuses in each fusible-switch VFC.
- D. Install fuses in control circuits if not factory installed.
- E. Install heaters in thermal-overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.
- F. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
- G. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify VFCs, components, and control wiring.
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each VFC with engraved nameplate.
 - 3. Label each enclosure-mounted control and pilot device.
- B. Operating Instructions: Frame printed operating instructions for VFCs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of VFC units.

3.4 CONTROL WIRING INSTALLATION

- A. Install wiring between VFCs and remote devices and facility's central-control system.
- B. Bundle, train, and support wiring in enclosures.
- C. Connect selector switches and other automatic control devices where applicable.
 - Connect selector switches to bypass only those manual- and automatic control devices that have no safety functions when switches are in manualcontrol position.
 - 2. Connect selector switches with control circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:

- 1. Test insulation resistance for each VFC element, bus, component, connecting supply, feeder, and control circuit.
- 2. Test continuity of each circuit.
- C. Tests and Inspections:
- 1. Inspect VFC, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
- 2. Test insulation resistance for each VFC element, component, connecting motor supply, feeder, and control circuits.
- 3. Test continuity of each circuit.
- 4. Verify that voltages at VFC locations are within 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Engineer before starting the motor(s).
- 5. Test each motor for proper phase rotation.
- 6. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- 7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- 8. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- D. VFCs will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies the VFC and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.6 STARTUP SERVICE

- A. Perform startup service.
- 1. Complete installation and startup checks according to manufacturer's written instructions.

3.7 ADJUSTING

- A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.
- B. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.
- C. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to six times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Engineer before increasing settings.
- D. Set the taps on reduced-voltage autotransformer controllers.

- E. Set field-adjustable circuit-breaker trip ranges.
- F. Set field-adjustable pressure switches.

3.8 PROTECTION

- A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until controllers are ready to be energized and placed into service.
- B. Replace VFCs whose interiors have been exposed to water or other liquids prior to Substantial Completion.

3.9 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, reprogram, and maintain VFCs.

SECTION 265100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior lighting fixtures, lamps, and ballasts.
 - 2. Emergency lighting units.
 - 3. Exit signs.
 - 4. Lighting fixture supports.
- B. Related Sections:
 - 1. Division 26 Section "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, and occupancy sensors.

1.3 DEFINITIONS

- A. BF: Ballast factor.
- B. CCT: Correlated color temperature.
- C. CRI: Color-rendering index.
- D. HID: High-intensity discharge.
- E. LER: Luminaire efficacy rating.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting fixture, including ballast housing if provided.
- H. L.E.D.: Light Emitting Diode.

1.4 SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of lighting fixture including dimensions.
 - 2. Emergency lighting units including battery and charger.
 - 3. Energy-efficiency data.
 - 4. Life, output (lumens, CCT, and CRI), and energy-efficiency data for LED's.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Installation instructions.
- D. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. 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.
- B. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.7 WARRANTY

- A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Emergency Lighting Unit Batteries: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least 0.125 inch minimum for 2' x 2' and 2' x 4' fixtures unless otherwise indicated.
 - b. UV stabilized.
- G. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

2.2 LED LIGHT FIXTURES

A. General:

1. Listing: LED fixtures shall be UL listed or UL classified, CE certified and PSA marked. LED fixture and systems shall meet RoHS (Removal of Hazardous

Substances) directives. Manufacturer shall be able to provide supporting documentation testing results.

- 2. LED drivers shall include the following features, unless otherwise indicated:
 - a. Minimum efficiency: 85% at full load.
 - b. Minimum operating ambient temperature: -4 deg F.
 - c. Input voltage: 120 277V (±10%) at 60 Hz.
 - d. Integral short circuit, open circuit, and overload protection.
 - e. Power factor: ≥ 0.95.
 - f. Total harmonic distortion: ≤ 20%.
 - g. Comply with FCC 47 CFR Part 15.
- 3. LED modules shall include the following features, unless otherwise indicated:
 - a. Comply with IES LM-79 and LM-80 requirements.
 - b. Minimum CRI 80 and color temperature 3000° K, unless otherwise specified in Lighting Fixture Schedule.
 - c. Minimum rated life: 50,000 hours per IES L70.
 - d. Light output lumens as indicated in the Lighting Fixture Schedule.
- H. LED Downlights:
 - 1. Housing, LED driver and LED module shall be products of the same manufacturer.
- I. Heat: Fixture housings shall be designed to transfer heat from the LED board to the outside environment.
- J. Fixtures for Wet and Damp Use: Fixtures themselves shall be sealed, rated and tested for appropriate environmental conditions, not accomplished by using an additional housing or enclosure.
- K. Connections: All hardwired connections to LED fixtures shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
- L. Burn-In-Time: All LED fixtures (100% of each lot) shall undergo a minimum eight-hour burn-in test during manufacturing.
- M. Single Source Components: All LED fixtures and power/data supplies shall be provided by a single manufacturer to ensure compatibility. Manufacturer shall have at least three years of experience designing, selling and supporting intelligent LED systems.

2.3 EMERGENCY POWER UNIT

- A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.
 - 1. Emergency Connection: Operate one lamp or driver continuously at an output of 1100 lumens or the lumen output rating of the fixture (whichever is less) each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
 - 2. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
 - a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - 3. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - 4. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.

2.4 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 - 1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
 - 2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lighting fixtures:
 - 1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
 - 2. Install lamps in each luminaire.
- B. Lay-in Ceiling Lighting Fixtures Supports:
 - 1. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 - 2. Fixture Support: Provide fixture support independent of ceiling grid. Provide a minimum of 4 hanger wires for each 2' x 4' fixture, and a minimum of 2 wires for each 2' x 2' fixture.
 - 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4 inch metal channels spanning and secured to ceiling tees
 - 4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- C. Suspended Lighting Fixture Support:
 - 1. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 - 2. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
 - 3. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.
- D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.2 IDENTIFICATION

A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

3.4 STARTUP SERVICE

A. Burn in all lamps that require specific aging period to operate properly, prior to occupancy by Owner. Burn-in fluorescent, compact fluorescent lamps, and LED fixtures intended to be dimmed, for at least 100 hours at full voltage.

3.5 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during otherthan-normal occupancy hours for this purpose. Some of this work may be required after dark.
 - 1. Adjust aimable luminaires in the presence of Architect.

SECTION 280500 - COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Electronic safety and security equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Sleeve seals.
 - 4. Common electronic safety and security installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For sleeve seals.

1.5 COORDINATION

- A. Coordinate arrangement, mounting, and support of electronic safety and security equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-inplace concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electronic safety and security items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."."

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 3. Pressure Plates: Carbon steel. Include two for each sealing element.
 - 4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electronic safety and security equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRONIC SAFETY AND SECURITY PENETRATIONS

A. Electronic safety and security penetrations occur when raceways, pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 6 inches above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electronic safety and security installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

SECTION 280513 - CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Retain or delete this article in all Sections of Project Manual, Drawings and general provisions of the Contract, including General and Supplementary Conditions Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire alarm wire and cable.
 - 2. Identification products.

1.3 DEFINITIONS

- A. Retain definition(s) remaining after this Section has been edited.
- B. BICSI: Building Industry Consulting Service International.
- C. EMI: Electromagnetic interference.
- D. IDC: Insulation displacement connector.
- E. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- F. Open Cabling: Passing telecommunications cabling through open space (e.g., between the study of a wall cavity).
- G. RCDD: Registered Communications Distribution Designer.

1.4 SUBMITTALS

A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An NRTL.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- 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.

1.6 PROJECT CONDITIONS

A. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.

PART 2 - PRODUCTS

2.1 PATHWAYS

- A. Support of Open Cabling: NRTL labeled for support of cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
 - 2. Lacing bars, spools, J-hooks, and D-rings.
 - 3. Straps and other devices.
- B. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems."
- C. Outlet boxes shall be no smaller than 2 inches wide, 3 inches high, and 2-1/2 inches deep.

2.2 FIRE ALARM WIRE AND CABLE

- 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. Comtran Corporation.
 - 2. Draka Cableteq USA.
 - 3. Genesis Cable Products; Honeywell International, Inc.
 - 4. Rockbestos-Suprenant Cable Corp.
 - 5. West Penn Wire; a brand of Belden Inc.
- B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.
- C. Signaling Line Circuits: Twisted, shielded pair, not less than No. 14 AWG.
 - Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a 2-hour rating.
- D. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 - 1. Low-Voltage Circuits: No. 14 AWG, minimum.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum.
 - 3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NTRL listed for fire alarm and cable tray installation, plenum rated, and complying with requirements in UL 2196 for a 2-hour rating.

2.3 IDENTIFICATION PRODUCTS

- 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. Brady Corporation.
 - 2. HellermannTyton.
 - Krov LLC.
 - 4. PANDUIT CORP.

- B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- C. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 INSTALLATION OF PATHWAYS

- A. Comply with TIA-569-B for pull-box sizing and length of conduit and number of bends between pull points.
- B. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." for installation of conduits and wireways.
- C. Install manufactured conduit sweeps and long-radius elbows whenever possible.
- D. Pathway Installation in Equipment Rooms:
 - 1. Extend conduits 84 inches above finished floor.
 - 2. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

3.2 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements in Division 26 Section "Hangers and Supports for Electrical Systems." for installation of supports for pathways, conductors and cables.

3.3 WIRING METHOD

- A. Coordinate this article with Drawings. Retain one of first three paragraphs below to specify wiring method.
- B. Install wiring in metal raceways and wireways. Conceal raceway except in unfinished spaces and as indicated. Minimum conduit size shall be 3/4 inch.
- C. Install wiring in raceways except in accessible indoor ceiling spaces and in interior hollow gypsum board partitions where cable may be used. Conceal raceways and wiring except in unfinished spaces and as indicated. Minimum conduit size shall be 3/4 inch. Control and data transmission wiring shall not share conduit with other building wiring systems.
- D. Install cable, concealed in accessible ceilings, walls, and floors when possible.
- E. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

3.4 FIRE ALARM WIRING INSTALLATION

- A. Comply with NECA 1 and NFPA 72.
- B. Wiring Method: Install wiring in metal raceway according to Division 26 Section "Raceway and Boxes for Electrical Systems." All raceways associated with fire alarm cabling shall be colored red.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.

- 2. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.
- C. Wiring Method:
 - 1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
 - 2. Fire-Rated Cables: Use of 2-hour, fire-rated fire alarm cables, NFPA 70.
 - 3. Signaling Line Circuits: Power-limited fire alarm cables shall not be installed in the same cable or raceway as signaling line circuits.
- D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- F. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.
- G. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.
- H. Wiring to Remote Alarm Transmitting Device: 1-inch conduit between the fire alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.5 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."
- B. Comply with TIA-569-B, "Firestopping" Annex A.
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.6 GROUNDING

- A. For communications wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

3.7 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Visually inspect UTP jacket materials for NRTL certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1.
 - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - 3. Test UTP cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

SECTION 280800 - COMMISSIONING OF DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section apply to all sections of Division 28.

1.2 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Division 23 "Commissioning of HVAC".
- C. Division 26 "Commissioning of Electrical Systems".

1.3 SUMMARY

A. This Section includes requirements for commissioning the digital, addressable fire alarm system.

1.4 DEFINITIONS

- A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- B. CxA: Commissioning Authority.
- C. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.
- D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.5 CONTRACTOR'S RESPONSIBILITIES

- A. Provide all labor, instrumentation, tools, and equipment costs for technicians for the performance of commissioning testing.
- B. Perform commissioning tests at the direction of the CxA.
- C. Attend construction phase coordination meetings.
- D. Provide information requested by the CxA for final commissioning documentation.
- E. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.6 CxA'S RESPONSIBILITIES

- A. Provide Project-specific construction checklists and commissioning process test procedures for all digital, addressable fire alarm systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.
- B. Direct commissioning testing.
- Provide test data, inspection reports, and certificates in Systems Manual.
- D. The CxA will be appointed by and work directly for The School District.

1.7 COMMISSIONING DOCUMENTATION

A. Provide the following information to the CxA for inclusion in the commissioning plan:

- 1. Process and schedule for completing construction checklists digital, addressable fire alarm system equipment, wiring and components to be verified and tested.
- 2. Test and inspection reports and certificates.
- 3. Corrective action documents.

1.8 SUBMITTALS

- Certificates of readiness.
- B. Certificates of completion of installation, inspection and testing.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL TESTING REQUIREMENTS

- A. Provide technicians, instrumentation, and tools to perform commissioning tests at the direction of the CxA.
- B. The CxA shall prepare detailed testing plans, procedures, and checklists for all systems to be commissioned as part of this project.

SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Manual fire-alarm boxes.
 - 2. System smoke detectors.
 - 3. Heat detectors.
 - 4. Notification appliances.
 - 5. Addressable interface device.

1.3 DEFINITIONS

- A. LED: Light-emitting diode.
- B. NICET: National Institute for Certification in Engineering Technologies.

1.4 SYSTEM DESCRIPTION

A. Noncoded, UL-certified addressable system, with multiplexed signal transmission, dedicated to fire-alarm service only.

1.5 SUBMITTALS

- A. General Submittal Requirements:
 - 1. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified fire-alarm technician, Level III minimum.
 - c. Licensed or certified by authorities having jurisdiction.
- B. Product Data: For each type of product indicated.
- C. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
 - 2. Include voltage drop calculations for notification appliance circuits.
 - 3. Include battery-size calculations.
 - 4. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
 - 5. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.
- D. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

- 2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
- 3. Provide copy of site-specific software to owner.
- 4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
 - a. Frequency of testing of installed components.
 - b. Frequency of inspection of installed components.
 - c. Requirements and recommendations related to results of maintenance.
 - d. Manufacturer's user training manuals.
- 5. Manufacturer's required maintenance related to system warranty requirements.
- E. Software and Firmware Operational Documentation.
 - 1. Software operating and upgrade manuals.
 - 2. Program software backup: On magnetic media or compact disc, with data files.
 - 3. Device address list.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level II technician.
- C. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm components from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 - 1. Notify Owner and Construction Manager no fewer than 7 days in advance of proposed interruption of fire-alarm service.
 - 2. Do not proceed with interruption of fire-alarm service without Owner or Construction Manager's written permission.

1.8 SEQUENCING AND SCHEDULING

A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.

B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.9 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning with Substantial Completion, provide software support for two years.
- C. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
 - 1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

1.10 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but no fewer than 1 unit.
 - 2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than 1 unit.
 - 3. Smoke Detectors and Heat Detectors: Quantity equal to 10 percent of amount of each type installed, but no fewer than 1 unit of each type.
 - 4. Keys and Tools: One extra set for access to locked and tamper proofed components.
 - 5. Audible and Visual Notification Appliances: Three of each type installed.
 - 6. Fuses: Two of each type installed in the system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. All new devices shall be fully compatible with the existing fire alarm panel and system, and shall not cause any existing system warranties to be voided.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
 - 1. Manual stations.
 - 2. Heat detectors.
 - 3. Smoke detectors.
 - 4. Duct smoke detectors.
 - 5. Automatic sprinkler system water flow.
- B. Fire-alarm signal shall initiate the following actions:
 - 1. Continuously operate alarm notification appliances.
 - 2. Identify alarm at fire-alarm control unit and remote annunciators.
 - 3. Transmit an alarm signal to the remote alarm receiving station.
 - 4. Unlock electric door locks in designated egress paths.
 - 5. Switch heating, ventilating, and air-conditioning equipment controls to firealarm mode.

- 6. Close smoke dampers in air ducts of designated air-conditioning duct systems.
- 7. Release magnetically held doors.
- 8. Activate relays to shut down HVAC equipment and exhaust fans.
- 9. Recall elevators to primary or alternate recall floors.
- 10. Record events in the system memory.
- C. System trouble signal initiation shall be by one or more of the following devices and actions:
 - 1. Open circuits, shorts, and grounds in designated circuits.
 - 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 - 3. Loss of primary power at fire-alarm control unit.
 - 4. Ground or a single break in fire-alarm control unit internal circuits.
 - 5. Abnormal ac voltage at fire-alarm control unit.
 - 6. Break in standby battery circuitry.
 - 7. Failure of battery charging.
 - 8. Abnormal position of any switch at fire-alarm control unit or annunciator.
 - 9. Failure or trouble with a carbon monoxide detector.
- D. Supervisory signal initiation shall be by one or more of the following devices and actions:
 - 1. Valve supervisory switch.
 - 2. Elevator shunt-trip supervision.
 - 3. Carbon monoxide detector activation.
- E. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators, and transmit signal to the supervising station. Record the event on system memory.

2.3 FIRE-ALARM CONTROL UNIT

- A. The existing addressable fire alarm control panel, and all existing devices shall remain in service.
 - 1. All new devices shall be fully compatible with existing system.
 - 2. Secondary power: Upgrade existing batteries as necessary to provide sufficient capacity to operate the system in standby (non-alarm condition) mode for 24 hours followed by 15 minutes in alarm mode.
 - 3. Programming: Contractor shall hire a qualified fire alarm vendor to reprogram the existing fire alarm panel after all device additions and alterations are complete.

2.4 REMOTE BOOSTER POWER SUPPLY

- A. Install Remote NAC Power Supplies (boosters) as required, to minimize NAC voltage drops. Remote NAC power supplies shall be treated as peripheral NAC devices and shall not be considered fire alarm control units.
- B. The NAC power supplies shall be fully enclosed in a surface mounted steel enclosure with hinged door and cylinder lock, and finished in red enamel. Door keys shall be the identical to FACP enclosure keys. The enclosure shall have factory installed mounting brackets for additional UL listed fire alarm equipment within its cabinet. Enclosures shall be sized to allow ample space for interconnection of all components and field wiring, and up to 10AH batteries. All

- FACP addressable control modules required to initiate the required NAC power supply output functions shall be installed within the NAC power supply enclosure.
- C. Remote booster power supplies shall provide four (4) synchronized Class B supervised and power limited, 24VDC filtered and regulated Notification Appliance Circuits (NACs). Each NAC output shall be configurable as a continuous 24Vdc auxiliary power output circuit. The booster power supply shall be capable of a total output of 10 amps @ 24VDC.
- D. All visible and audible NACs within the facility shall be synchronized.
- E. Upon failure of primary AC power, the remote power supply shall automatically switch over to secondary battery power without losing any system functions. It shall be possible to delay reporting of an AC power failure for up to 6 hours. All standby batteries shall be continuously monitored by the power supply. Low battery and disconnection of battery power supply conditions shall immediately be annunciated locally as battery trouble. All power supply trouble conditions (DC power failure, ground faults, low batteries, and IDC/NAC circuit faults) shall identify the specific remote power supply affected at the main FACP. All power supply trouble conditions except loss of AC power shall report immediately.
- F. The remote booster power supply shall be capable of recharging up to 24AH batteries to 70% capacity in 24 hours maximum. Batteries provided shall be sized to meet the same power supply performance requirements as the main FACP, as detailed elsewhere in this specification.

2.4 MANUAL FIRE-ALARM BOXES

- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
 - 1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 - 2. Station Reset: Key- or wrench-operated switch.
 - 3. Indoor Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.

2.5 SYSTEM SMOKE DETECTORS

- A. General Requirements for System Smoke Detectors:
 - 1. Comply with UL 268; operating at 24-V dc, nominal.
 - 2. Detectors shall be four-wire type.
 - 3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 - 4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - 5. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.

- 6. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.
- 7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
 - a. Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 deg F per minute.
 - b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 deg F.
 - c. Provide multiple levels of detection sensitivity for each sensor.
- B. Photoelectric Smoke Detectors:
 - Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 - 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
- C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.
 - Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 - 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
 - 3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
 - 4. Each sensor shall have multiple levels of detection sensitivity.
 - 5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
 - 6. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.6 CARBON MONOXIDE DETECTORS

- A. General: Carbon monoxide detector listed for connection to fire-alarm system.
 - 1. Mounting: Adapter plate for outlet box mounting.
 - 2. Testable by introducing test carbon monoxide into the sensing cell.
 - 3. Detector shall have an integral sounder base which shall emit a temporal 4 signal upon C.O. detection.
 - 4. Detector shall send trouble alarm when nearing end-of-life, power supply problems, or internal faults.

- 5. Comply with UL 2075
- 6. Locate, mount, and wire according to manufacturer's written instructions.
- 7. Provide means for addressable connection to fire-alarm system. Upon activation, detector shall indicate a system supervisory signal and sound the integral alarm.
- 8. Test button simulates an alarm condition.

2.7 HEAT DETECTORS

- A. General Requirements for Heat Detectors: Comply with UL 521.
- B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or a rate of rise that exceeds 15 deg F per minute unless otherwise indicated.
 - 1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
 - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.8 NOTIFICATION APPLIANCES

- A. General Requirements for Notification Appliances: Individually addressed, connected to a signaling line circuit, equipped for mounting as indicated and with screw terminals for system connections
- B. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.
 - 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.
- C. Voice/Tone Notification Appliances:
 - 1. Appliances shall comply with UL 1480 and shall be listed and labeled by an NRTL.
 - 2. High-Range Units: Rated 2 to 15 W.
 - 3. Low-Range Units: Rated 1 to 2 W.
 - 4. Mounting: Flush.
 - 5. Matching Transformers: Tap range matched to acoustical environment of speaker location.
- D. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens.
 - 1. Rated Light Output: as indicated on plans.
 - 2. Mounting: Wall or ceiling mounted as indicated on plans.
 - 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 - 4. Flashing shall be in a temporal pattern, synchronized with other units.
 - 5. Strobe Leads: Factory connected to screw terminals.
 - 6. Mounting Faceplate: Factory finished, white.

2.9 REMOTE ANNUNCIATOR

- A. Existing remote annunciators shall remain in service.
- B. Provide a framed graphic map in the building lobby adjacent to the existing annunciator. The graphic map shall indicate building zones which shall be

coordinated with the programmed addresses of initiation devices to provide local fire responders with directional information.

2.10 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.

2.11 DIGITAL ALARM COMMUNICATOR TRANSMITTER

Existing digital alarm communicator transmitter shall remain in service.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72 for installation of fire-alarm equipment.
- B. Smoke- or Heat-Detector Spacing:
 - 1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
 - 2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
 - 3. Smooth ceiling spacing shall not exceed 30 feet.
 - 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A in NFPA 72.
 - 5. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.
 - 6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.
- C. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.
- D. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
- E. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.
- F. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling.
- G. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.2 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device

controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

- 1. Smoke dampers in air ducts of designated air-conditioning duct systems.
- 2. Supervisory connections at valve supervisory switches.

3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- B. Install framed instructions in a location visible from fire-alarm control unit.

3.4 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.5 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by authorities having jurisdiction.
- B. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
 - b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 - 4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
 - 5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 - 6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
- D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

- E. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.
- G. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.